

**FORT TOTTEN
U.S. ARMY FACILITY
FORMER UST SITE INVESTIGATION REPORT
BUILDINGS 334 AND 336**

DRAFT DOCUMENT

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13. ABSTRACT (Maximum 200 words) The U.S. Army Corps of Engineers (USACE) has tasked IT Corporation to perform investigative tasks for two former UST sites at Fort Totten. Fort Totten is located in northeast Queens Borough, New York City, New York. The purpose of this work is to support the eventual excessing and transfer of property in accordance with the 1995 Base Realignment and Closure Program (BRAC). Work for this assignment was performed under Contract No. DACA31-95-D-0083, Delivery Order 0006. The work comprised the investigation and sampling of soil and groundwater associated with former USTs at Buildings 334 and 336.					
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TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	1-1
1.1 PURPOSE AND APPROACH	1-1
1.2 REPORT ORGANIZATION	1-1
2.0 TECHNICAL APPROACH TO FIELD OPERATIONS	2-1
2.1 SOIL INVESTIGATION PROCEDURES	2-1
2.1.1 Soil Sample Acquisition Procedures	2-1
2.1.2 Soil Sample Handling and Collection Procedures	2-1
2.1.3 Soil Sample Logging and Lithologic Description	2-2
2.2 GROUNDWATER INVESTIGATION PROCEDURES	2-2
2.2.1 Geoprobe Activities	2-3
2.2.2 Groundwater Sampling	2-3
2.3 SAMPLE PREPARATION AND SHIPPING	2-4
2.4 DECONTAMINATION PROCEDURES	2-4
3.0 CHEMICAL DATA QUALITY AND VALIDATION	3-1
3.1 LABORATORY SERVICES	3-1
3.2 DATA VALIDATION	3-1
4.0 SOIL AND GROUNDWATER GUIDANCE AND STANDARDS	4-1
4.1 NYSDEC AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES	4-1
4.2 NYSDEC STARS MEMO #1: PETROLEUM-CONTAMINATED SOIL GUIDANCE POLICY	4-1
5.0 INVESTIGATION ACTIVITIES	5-1
5.1 FORMER BUILDING 334 UST	5-1
5.1.1 Previous Investigation	5-1
5.1.2 Additional Investigation	5-1
5.2 FORMER BUILDING 336 UST	5-2
5.2.1 Previous Investigation	5-2
5.2.2 Additional Investigation	5-3
6.0 INVESTIGATION DERIVED WASTE	6-1
7.0 REFERENCES	7-1

LIST OF FIGURES

Figure

- 1-1 Location Map of Fort Totten
- 1-2 Site Map of Fort Totten
- 5-1 Building 334 Former USTs Previous Soil Sample Locations
- 5-2 Building 334 Soil and Groundwater Sample Locations
- 5-3 Building 336 Former UST #11 Previous Soil Sample Locations
- 5-4 Building 336 Soil Boring and Groundwater Sample Locations

LIST OF TABLES

Table

- | | |
|-----|------------------------------|
| 5-1 | Soil Sampling Program |
| 5-2 | Groundwater Sampling Program |
| 5-3 | Soil Analytical Data |
| 5-4 | Groundwater Analytical Data |

LIST OF APPENDICES

Appendix

- A Data Validation Memoranda
- B NYSDEC STARS Memo #1 Soil Guidance and Ambient Water Quality Standards and Guidance Values
- C Soil and Groundwater Sampling Analytical Results
- D Boring Logs
- E Purge Form
- F Photo Log

LIST OF ACRONYMS

AGV	Alternative Guidance Value
AWQSGV	Ambient Water Quality Standards and Guidance Values
bgs	Below ground surface
BRAC	Base Realignment and Closure Program
HASP	Health and Safety Plan
MTBE	Methyl tert-butyl ether
NYSDEC	New York State Department of Environmental Conservation
PCBs	Polychlorinated biphenyls
PID	Photoionization detector
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WP	Work Plan

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) has tasked IT Corporation to perform investigative tasks at two former UST sites at Fort Totten U.S. Army Facility. Fort Totten is located in the northeast portion of Queens Borough, New York City, New York. The facility is situated on a peninsula extending out into Little Neck Bay (Figure 1-1). The purpose of this work is to support the eventual excessing and transfer of property in accordance with the 1995 Base Realignment and Closure Program (BRAC). Work for this assignment was performed under Contract No. DACA31-95-D-0083, Delivery Order 0006. The work was performed to investigate potential soil and groundwater contamination at former UST sites at Buildings 334 and 336.

A site map for Fort Totten is provided as Figure 1-2. Fort Totten consists of the "Old Fort" area, which covers the northern portion of the site, and the "New Fort" area, which covers the remainder of the site. The Old Fort area was built by the U.S. Army in 1860 and has since been designated as a Federal Historic Site.

The work was conducted in accordance with USACE, U.S. Environmental Protection Agency (USEPA), and the New York State Department of Environmental Conservation (NYSDEC) requirements and fully complied with the existing Health and Safety Plan (HASP) (1996).

1.1 PURPOSE AND APPROACH

The purpose of this report is to present the results of investigation at two former UST locations at Fort Totten. The investigative activities occurred at Buildings 334 and 336.

1.2 REPORT ORGANIZATION

This report is organized as follows:

Section 1.0 – Introduction

Section 2.0 – Technical Approach to Field Operations

Section 3.0 – Chemical Data Quality and Validation

Section 4.0 – Soil and Groundwater Guidance and Standards

Section 5.0 – Investigation Activities

Section 6.0 – Investigation Derived Waste

Section 7.0 - References

Figures

Tables

Appendices:

Appendix A – Data Validation Memoranda

Appendix B – NYSDEC STARS Memo #1 Soil Guidance and Ambient Water Quality Standards and Guidance Values

Appendix C – Soil and Groundwater Sampling Analytical Results

Appendix D – Boring Logs

Appendix E – Purge Form

Appendix F – Photo Log

2.0 TECHNICAL APPROACH TO FIELD OPERATIONS

The purpose of this work was to characterize areas of environmental concern at the Fort Totten U.S. Army Facility. The methodology, procedures, measurements, and observations required for each type of field activity are documented in the following sections. These activities included:

- Soils Investigation Procedures;
- Groundwater Investigation Procedures;
- Sample Preparation and Shipping; and
- Decontamination Procedures.

Standard procedures have been outlined for all field activities in accordance with the requirements of USACE, USEPA, and NYSDEC.

2.1 SOIL INVESTIGATION PROCEDURES

The characterization of the soils was accomplished by careful logging and sampling of surface and subsurface soils. A Site Geologist was present during all geoprobing and soil sample collection activities to maintain descriptive logs and collect appropriate samples for chemical analysis. Samples were screened and/or prioritized in the field by visual inspection for staining or discoloration and/or with a photoionization detector (PID) as appropriate.

Soil sampling activities proceeded as follows:

- a. Clearance of all underground utilities was arranged with local utility companies.
- b. Sampling and geoprobing was performed under direct supervision of the assigned Site Geologist.
- c. All soil sampling points were located to map accuracy at the time of sample collection and the locations were marked or staked for future reference.

2.1.1 Soil Sample Acquisition Procedures

Soil samples were collected from the subsurface using the geoprobe technique. The sample acquisition techniques are discussed below.

2.1.1.1 Soil Boring Procedures

The geoprobe push-rod technique was used to complete soil borings. All boring operations were conducted in accordance with USACE geotechnical requirements (USACE, 1994). Prior to geoprobing, the water table elevation was estimated from prior drilling activities. Sampling intervals were adjusted to accommodate site-specific conditions.

Geoprobe Soil Sampling: Soil samples were collected using a truck-mounted geoprobe push-rod rig equipped with approximately 1.25-in diameter push-rods, points, and 4-ft long geoprobe stainless steel macro core soil samplers with a disposable plastic liner. Using a hydraulic hammer, the geoprobe rod was pushed into the ground to the proposed sampling depth. The rod was withdrawn and a decontaminated stainless steel geoprobe sampler was attached to the rod. The sampler was driven through the desired sampling interval and retrieved. Once the completion depth was reached, the hole was backfilled to the surface.

2.1.2 Soil Sample Handling and Collection Procedures

During the sampling phase, the volatile and semivolatile organic samples were collected first and were transferred from the geoprobe sampler in a manner such that air space was minimized in the sample bottle. Soil samples were packed in the appropriate sample bottles. For composite soil samples, the material was placed in a precleaned stainless steel bowl, coned and quartered, and placed in the appropriate sample bottles for non-volatile analyses. For composite soil samples analyzed for Volatile Organic Compounds (VOCs) and Semivolatile Organic Compounds (SVOCs), a portion of each sample was placed in the appropriate bottles as the samples were collected. The remaining sample portions were

homogenized as described above and placed in the appropriate sample bottles for non-volatile analyses. Each sample bottle contained a sample label, which included the project name, sample number, analysis to be performed, time, date, and sampler's initials. Disposable latex gloves were used during all sampling activities and were changed between each sample location.

Sample labels and the chain of custody were completed following the collection of each sample. The labels were placed on the sample bottle and the bottle placed immediately into a cooler. The cooler was iced and samples kept at a temperature of 4°C. The completed chain of custody was sealed in a plastic bag inside the sample cooler.

2.1.3 Soil Sample Logging and Lithologic Description

During the advancement of geoprobe points, the Site Geologist fully described all activities in the field boring logs. As per USACE geotechnical requirements (USACE, 1994), the following data was recorded in the boring logs at the drill site:

- a. The name of the Site Geologist(s), project name, location, and site identification (ID);
- b. Depths in feet and fractions thereof;
- c. Soil descriptions, in accordance with the Unified Soil Classification System (USCS) and prepared in the field by the attending Site Geologist, which include the following information:
 - Classification;
 - USCS symbol;
 - Secondary components and estimated percentage;
 - Color (using Munsell Soil Color Chart);
 - Plasticity;
 - Consistency (cohesive soil) or density (noncohesive soil);
 - Moisture content; and
 - Texture/fabric/bedding.
- d. Cutting descriptions, including basic classification, secondary components, and other apparent parameters;
- e. Visual estimates of secondary soil constituents (If terms such as "trace," "some," or "several" were used, their quantitative meanings were defined in a general legend);
- f. Length of sample recovered for each sample interval for driven samples.
- g. Estimated depth interval for each sample;
- h. Depth to water first encountered during geoprobing and the method of determination (Any distinct water-bearing zones below the first zone also was noted);
- i. General description of the geoprobing equipment used including the rod size, manufacturer, model, and geoprobing personnel;
- j. Geoprobing sequence;
- k. Any unusual problems;
- l. Start and completion dates of all borings, and a chronological time-sequence of all significant events;
- m. Lithologic boundaries;
- n. Volatile organic vapors in surface and subsurface soil samples, as measured using a PID; and
- o. Additional comments as appropriate.

2.2 GROUNDWATER INVESTIGATION PROCEDURES

Groundwater samples were collected via the geoprobe sampling technique.

2.2.1 Geoprobe Activities

Geoprobe activities proceeded as follows:

- a. Clearance of all underground utilities was arranged with local utility companies.
- b. Sampling equipment decontamination procedures are discussed in Section 2.4.
- c. Geoprobe activities were performed under direct supervision of the assigned Site Geologist.
- d. All geoprobe points were located to map accuracy at the time of sample collection and locations were marked or staked for future reference.

A field notebook was kept by the site geologist during all geoprobe activities. The notebook contained, at a minimum, the following information: description and map of the geoprobing site, on-site personnel, all sampling/geoprobing activities, and monitoring/screening results.

Geoprobe cuttings, if any, were visually inspected for evidence of contamination and screened with a PID. Drill cuttings that caused a sustained PID reading of greater than 5 ppm were containerized in 55-gallon steel drums. These drums were labeled, dated and temporarily staged at the drill site pending sampling analytical results. Drill cuttings that did not exhibit any signs of contamination were backfilled into the geoprobe boring.

2.2.2 Groundwater Sampling

Groundwater sampling techniques for screening level samples collected directly through the geoprobe system are discussed in the following sections.

2.2.2.1 Geoprobe Screening Level Sampling

Groundwater samples were collected for screening purposes using the geoprobe system. The geoprobe groundwater sampling system consists of hollow steel geoprobe rods, a dedicated steel drive point, a retractable 4-ft stainless steel screen, and dedicated 1/4-in polyethylene tubing. The drive point was hydraulically driven to the desired sampling depth and disengaged. The rods were then raised, allowing the stainless steel screen to drop into the open interval. Clean, dedicated polyethylene tubing was then inserted down the rods and engaged to the screen section. A peristaltic pump connected to the 1/4-in tubing was used for purging and sampling. Groundwater screening samples were collected in the following manner:

All equipment was decontaminated using techniques described in Section 2.4 prior to its delivery to a sampling site;

Purging and sampling was accomplished by connecting dedicated disposable polyethylene tubing to a peristaltic pump;

For purging, a minimum of five bore volumes was removed from the geoprobe point. One well volume equates to 0.041 times the water column height (feet). If the discharge was not at stable pH, temperature, specific conductance, and turbidity after five purge volumes were removed, purging continued until these parameters stabilized, if feasible;

For low permeability formations, low pumping rates were maintained during purging to avoid overpumping, or pumping the well to dryness. Purging began at the lowest pump setting. The discharge rate was gradually increased until it matched the rate of contribution from the aquifer. The purging rate was modified to prevent significant drawdown.

If the Geoprobe point was pumped to near dryness at a rate less than 0.5 gpm, the water level was allowed to recover to a sufficient level for sampling prior to initiating sample collection;

Water quality parameters including pH, temperature, and specific conductance, were measured and recorded at least once for every volume of purge water removed;

Samples were collected in the following order: VOCs and SVOCs. Sample water for VOCs was collected at a decreased flow rate (0.1 to 0.5 gpm); and

Sample labels and the chain of custody were completed following the collection of each sample. The labels were placed on the bottle and the bottle placed immediately into a cooler. The cooler was iced and the samples kept at a temperature of approximately 4°C. The completed chain of custody was placed in a plastic bag taped to the inside lid of the cooler with the sample.

2.3 SAMPLE PREPARATION AND SHIPPING

Samples were returned to the sample preparation area at the end of each day. The samples were prepared by the site personnel for shipment to the laboratory in the following manner:

- Sample bottles were removed from the field cooler and inspected for integrity;
- Labels and chains of custody were inspected for completeness;
- Sample bottles were wrapped with bubble wrap;
- The bottom and sides of a clean cooler were lined with bubble wrap or styrofoam packing material;
- Samples were placed in the cooler using additional bubble wrap between bottles to provide a snug fit;
- Double-bagged ice or blue ice sealed in zip-lock bags was placed above the sample bottles;
- Additional bubble wrap or suitable packing material was placed above the blue ice to fill any remaining space in the cooler;
- The Chain-of-Custody forms were placed in a zip-lock bag and the bag was taped to the inside of the cooler lid;
- The lid was secured to the cooler with packaging tape; and
- IT Corporation personnel delivered the cooler(s) to the shipping agent.

2.4 DECONTAMINATION PROCEDURES

All equipment that was in contact with potentially contaminated material was decontaminated prior to use at each sampling location. Decontamination procedures for field equipment are described in the following sections. All equipment was thoroughly decontaminated before use and between sampling locations. Sample retrieval equipment was decontaminated between each sampling event.

Geoprobe/Drilling Equipment

All geoprobe equipment, including the geoprobe rods, was steam cleaned with tap water.

Sampling Materials

Stainless steel bowls, spoons, and other soil sampling equipment were cleaned with a tap water and Alconox wash, rinsed with tap water, and rinsed with deionized water. Measuring tapes were cleaned in an Alconox wash and rinsed with tap water and deionized water.

All decontaminated equipment was stored on clean plastic sheeting in a designated area. Equipment stored for long periods was covered with clean plastic sheeting or placed in clean plastic bags. Monitoring equipment was protected from contamination to the extent possible using a protective covering such as a plastic bag.

3.0 CHEMICAL DATA QUALITY AND VALIDATION

This section presents an assessment of data quality as outlined in the September 1996 Fort Totten WP. This assessment includes a review of field QC samples and a summary of the validation of 10 percent of the data.

3.1 LABORATORY SERVICES

The analytical services for the project were provided by Severn Trent Laboratories, Inc. Severn Trent Laboratories is a New York certified and USACE validated laboratory.

3.2 DATA VALIDATION

As stated in the September 1996 Fort Totten WP, 10 percent of the data were validated using USEPA Region II protocol. Data validation memorandums are presented in Appendix A. The following specific items were reviewed by IT Corporation to determine limitations for the data:

- Sample collection data;

- Sample holding times and methods of preservation;

- Detection limits compliance;

- Documentation that the analytical results are in control and within the linear range of the analysis;

- Associated calibration data to confirm that the linear regression is > 0.995 ;

- Documentation on the traceability of calibration and control standards;

- Associated control checks to confirm that the daily analysis is in control;

- Documentation of analytical methodology and QC methodology; and

- The potential presence of interferences and inaccuracy in analytical methods (check laboratory blanks and spike recoveries).

4.0 SOIL AND GROUNDWATER GUIDANCE AND STANDARDS

This section describes two documents published by the New York State Department of Environmental Conservation (NYSDEC) and are presented in **Appendix B: Ambient Water Quality Standards and Guidance Values** and the **Petroleum-Contaminated Soil Guidance Policy**. These documents are included to provide relevant guidance and standard values for comparison to site derived data. The Petroleum Contaminated Soil Guidance Policy values are displayed along with the soil sample detections for comparison in **Table 5-3**. The Ambient Water Quality Standards and Guidance Values are displayed along with groundwater sample detections in **Table 5-4**.

4.1 NYSDEC AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

The values provided in this document represent concentrations that were derived according to scientific procedures that are in regulation (**6NYCRR Part 702**), to protect the state's waters. A standard is a value that has not been promulgated and placed into regulation. A guidance value may be used where a standard has not been established for a particular water class and type of value. The standards and guidance values in this document represent the maximum allowable concentration of a contaminant at which there is no significant threat to human health and/or the environment (NYSDEC, 1993).

4.2 NYSDEC STARS MEMO #1: PETROLEUM-CONTAMINATED SOIL GUIDANCE POLICY

The Petroleum-Contaminated Soil Guidance Policy provides guidance on the handling, disposal, and/or reuse of non-hazardous petroleum-contaminated soils. The values listed in this document are not standards, but are intended to provide guidance in determining whether the concentration of contaminants in soil require investigation and remediation to levels which do not pose a threat to groundwater, human health, and/or the environment (NYSDEC, 1992).

5.0 INVESTIGATIVE SAMPLING PROGRAM

The following sections describe environmental sampling and investigative activities performed at Fort Totten. A list of the soil and groundwater samples collected is provided in Tables 5-1 and 5-2, respectively. The soil and groundwater analytical data are shown in Tables 5-3 and 5-4, respectively. The soil boring logs and groundwater purge form are provided in Appendices D and E, respectively. A photo log of the former UST sites is provided in Appendix F. The following describes the investigation, sampling activities, and analytical results associated with each site.

5.1 FORMER BUILDING 334 UST

A 4,000-gallon steel UST (UST #3) located southwest of Building 334 was removed in 1994 (F.J. Washington, 1996). A one inch hole was found at the bottom of the tank. UST#3 was also removed with four other USTs (UST#1, UST#2, UST#4, and UST#4A), which contained gasoline or fuel oil, to form one excavation (Figure 5-1). These tanks had rust spots and/or cracks that could have resulted in leakage of the tank contents. Approximately 364 tons of contaminated soil were removed from the excavation for offsite disposal.

5.1.1 Previous Investigation

Fifteen soil samples were collected from the excavation on December 13, 1994 (Figure 5-1). Four of the samples were associated with UST#3. One soil sample was collected from approximately 8 ft bgs from directly beneath UST#3. The three other samples were collected from the associated sidewalls from a depth of approximately 8 ft bgs. Each sample was analyzed for VOCs, SVOCs, PCBs, and lead. PCBs were analyzed since the tank was located near an electrical transformer. Lead was analyzed since some of the tanks may have been previously used to store leaded gasoline.

Six samples had elevated concentrations of SVOCs. Sample SL-31, collected beneath former UST #3, had elevated concentrations of VOCs indicating gasoline contamination. There were no PCBs or lead detected in any of the samples. An additional 20 cubic yards of soil were removed from the excavation on March 15, 1995. Seven additional soil samples were collected. These samples were analyzed only for SVOCs. There were reportedly no elevated concentrations of SVOCs detected in these samples. However, the final endpoint testing should have included testing for gasoline contamination as prescribed by NYSDEC's STARS Memo No.1. These samples should have also been analyzed for VOCs and MTBE.

5.1.2 Additional Investigation

Additional soil sampling was performed to verify that all of the VOC contaminated soil was removed and there is no impact to groundwater in the vicinity of the former Building 334 UST #3. Five geoprobe points (FT334SB1, FT334SB2, FT334SB3, FT334SB4, and FT334SB5) were advanced in the vicinity of former UST #3 (Figure 5-2).

The soil consisted of medium-sandy backfill below the blacktop to approximately 8 ft bgs at each boring. Silt and clayey-silt material was encountered from 8-16 ft bgs. Saturated conditions were encountered from approximately 7.5-9 ft bgs, and then graded to slightly moist material below 9 ft bgs at each boring. Petroleum/gasoline soil staining and odors were encountered at approximately 8 ft bgs at each boring. PID readings ranged from 0-1,000 ppm from 6-12 ft bgs and 3-20 ppm from 12-16 ft bgs.

Soil borings FT334SB4 and FT334SB5 were advanced to 24 ft bgs. The borings consisted of silt and clayey silt from 16 to 20 ft bgs and saturated fine to medium sands from 20 to 24 ft bgs. From 16 to 20 ft bgs in boring FT334SB5, a slight petroleum odor and PID readings of 5-10 ppm were noted. The borings contained a decomposed gasoline odor and PID readings from 10-77 ppm from 20 to 24 ft bgs.

Two composite soil samples were collected and analyzed for VOCs, MTBE, and SVOCs (Table 5-1). Each composite soil sample was collected from two or more soil borings. Soil sample COMP334SB was collected from the five borings from depths ranging from 8-10 ft bgs. Soil sample FT334COMP2 was collected from borings FT334SB4 and FT334SB5 from 20-24 ft bgs.

Eleven VOCs were detected above the TCLP Alternative Guidance Value (AGV) in soil sample COMP334SB. The following VOCs were detected above the TCLP AGV of 100 ppb: n-propylbenzene (1,500 ppb), isopropylbenzene (470 ppb), ethylbenzene (2,300 ppb), m- and p-xylenes (7,700 ppb), o-xylene (1,300 ppb), total xylenes (8,800 ppb), 1,3,5-trimethylbenzene (1,500 ppb), 1,2,4-trimethylbenzene (11,000 ppb), p-isopropyltoluene (360 ppb), and n-butylbenzene (590 ppb). Naphthalene (1,600 ppb) was detected above the TCLP AGV of 200 ppb.

Six SVOCs were detected above the TCLP AGV of 0.04 ppb in soil sample COMP334SB: benzo(a)anthracene (330 ppb), chrysene (370 ppb), benzo(b)fluoranthene (190 ppb), benzo(k)fluoranthene (270 ppb), benzo(a)pyrene (260 ppb), and indeno(1,2,3-cd)pyrene (110 ppb).

There were no VOCs or SVOCs detected above the TCLP AGV in soil sample FT334COMP2.

Groundwater sampling using the geoprobe technique was performed to verify that there is no groundwater contamination in the vicinity of the former Building 334 UST #3. According to the Work Plan, groundwater samples were to be collected from a minimum of two locations, just below the water table. However, due to the highly contaminated soil and groundwater observed at this location and after consultation with the New York USACE representative, only one groundwater sample was necessary for analysis. The saturated conditions encountered at 7.5 ft bgs appeared to be perched groundwater. Thus the deeper saturated zone found below 20 ft bgs was sampled.

Groundwater sample FT334GW4 was collected from boring FT334SB4 (Figure 5-2). The sample was collected from a depth interval of 20-23 ft bgs and was analyzed for VOCs, MTBE, and SVOCs (Table 5-2). The sample had a strong decomposed gasoline odor and a PID reading of 20 ppm.

Eight VOCs were detected above the NYS Ambient Water Quality Standards and Guidance Values (AWQSGV) in sample FT334GW4. Benzene was detected at 5,600 ppb, above the AWQSGV of 0.7 ppb. The following VOCs were detected above the AWQSGV of 5 ppb: toluene (2,600 ppb), n-propylbenzene (170 ppb), ethylbenzene (2,200 ppb), m- and p-xylenes (3,000 ppb), o-xylene (660 ppb), total xylenes (4,000 ppb), and 1,2,4-trimethylbenzene (800 ppb). Methyl tert-butyl ether was detected at 360 ppb.

No SVOCs were detected in sample FT334GW4 above the AWQSGV.

5.2 FORMER BUILDING 336 UST

A 3,000-gallon steel UST located west of Building 336 was removed in 1994 (F.J. Washington, 1996) (Figure 5-3). The tank reportedly stored fuel oil and was badly corroded upon removal. Approximately 35 tons of contaminated soil were removed from the excavation for offsite disposal.

5.2.1 Previous Investigation

Five soil samples were collected from the excavation on October 5, 1994 (Figure 5-3). One soil sample was collected from approximately 7 ft bgs from directly beneath the tank. One soil sample was collected from each sidewall from a depth of approximately 6 ft bgs. Each sample was analyzed for VOCs, SVOCs, PCBs, and lead. PCBs were analyzed since the tank was located near an electrical transformer. Lead was analyzed since the tank may have been previously used to store leaded gasoline.

The analytical results for the sample collected from beneath the tank showed evidence of petroleum contamination. Ten VOCs and nine SVOCs were detected at elevated concentrations. All of the soil samples contained low levels of lead (3.6 to 18.8 ppm). However, these results also include samples collected from the four sidewalls where there was no evidence of any petroleum contamination. There were no PCBs detected in any of the samples.

Additional soil excavation was performed on January 19, 1995 to remove the contaminated soil from beneath the former tank location. Soil was removed to the top of the concrete slab located at approximately 8 ft bgs. Approximately 5 cubic yards of additional soil were removed from the excavation. There was no evidence of contamination based on screening with an OVA monitor of all areas around the periphery of the concrete slab. However, no additional soil samples were collected. Soil samples should

have been collected beneath the concrete pad, as indicated by the NYSDEC Division of Environmental Remediation in a letter dated October 28, 1999, to verify that all soil contamination was removed.

5.2.2 Additional Investigation

Soil sampling was performed to verify that all contaminated soil was removed and there is no impact to groundwater in the vicinity of the former Building 336 UST. Eight geoprobe points were advanced at the former UST area (FT336SB1-FT336SB8) (Figure 5-4).

Four of the borings (FT336SB1, FT336SB2, FT336SB3, and FT336SB4) were met with refusal at the concrete pad for the former UST at 7.5 ft bgs. Each boring consisted of medium sand backfill. Saturated and petroleum contaminated sands with PID readings from 5-132 ppm were encountered from 6-7.5 ft bgs.

After consultation with the New York USACE representative, one boring (FT336SB5) was advanced to 32 ft bgs to determine the water table depth for groundwater sampling. Groundwater was encountered from 6-9 ft bgs but appeared to be perched groundwater and was not sampled. Deeper groundwater was not encountered in this boring, thus no groundwater samples were collected from this area. There was no contamination observed in this boring. The boring consisted of fine to coarse sands from 0-8 ft bgs, silty-sand and sandy-silt from 8-10 ft bgs, silt from 10-16 ft bgs, and silt with occasional sandy lenses from 16 to 32 ft bgs.

Three borings (FT336SB6, FT336SB7, and FT336SB8) were advanced to 16 ft bgs. Petroleum contaminated zones were encountered in borings FT336SB6 (7-14.5 ft bgs), FT336SB7 (8-10.5 ft bgs), and FT336SB8 (5.5-9 ft bgs). PID readings ranged from 3-159 ppm in these borings.

Two composite soil samples were collected and analyzed for VOCs, MTBE, and SVOCs (Table 5-1). Each composite soil sample was collected from four soil borings. Soil sample COMP336SB was collected from four borings (FT336SB5-FT336SB8) at depths ranging from 8-10 ft bgs. Soil sample FT336COMP2 was collected from four borings (FT336SB5-FT336SB8) at depths ranging from 12-18 ft bgs.

Four VOCs were detected above the TCLP AGV in soil sample COMP336SB. The following VOCs were detected above the TCLP AGV of 100 ppb: 1,3,5-trimethylbenzene (140 ppb), 1,2,4-trimethylbenzene (420 ppb), and n-butylbenzene (130 ppb). Naphthalene (370 ppb) was detected above the TCLP AGV of 200 ppb.

Five SVOCs were detected above the TCLP AGV of 0.04 in soil sample COMP336SB: benzo(a)anthracene (74 ppb), chrysene (90 ppb), benzo(b)fluoranthene (49 ppb), benzo(k)fluoranthene (65 ppb), and benzo(a)pyrene (58 ppb).

There were no VOCs or SVOCs detected above the TCLP AGV in soil sample FT336COMP2.

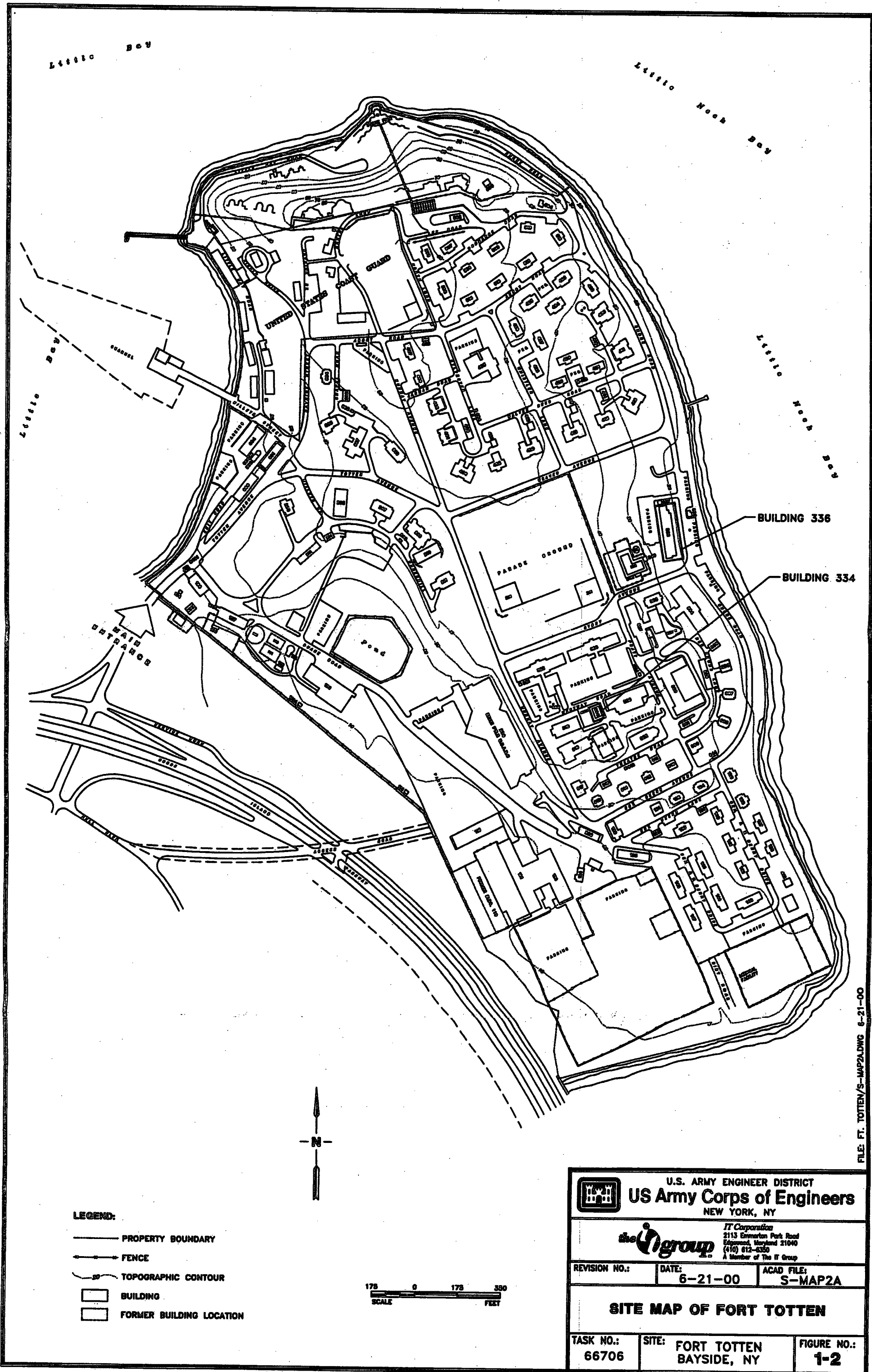
6.0 INVESTIGATION DERIVED WASTE

Contaminated soil cuttings from the soil borings were temporarily stored in a 55-gallon drum. The drum was approximately half full of soil. A second drum contains PPE and plastic soil macrocore sleeves. The soil will be removed and properly disposed of offsite with the excavated soil from Buildings 137, 141, 424, and 430.

7.0 REFERENCES

- ICF Kaiser Engineers, Inc. 1995. ICF Kaiser Quality Control Program for USACE Contracts.
- ICF Kaiser Engineers, Inc. 1996. Fort Totten, Bellmore U.S. Army Maintenance Facility, Camp Kilmer, and Camp Pedricktown. Site Health and Safety Plan. Final Document.
- IT Corporation. 2000. Fort Totten U.S. Army Facility, Work Plan, Former UST Site Investigations, Buildings 334 and 336. Final Document.
- F.J. Washington. 1996. Fort Totten Tank Closure Report No. 1, Removal of Three Gasoline and Two Fuel Oil Underground Storage Tanks Located Near Building #334.
- F.J. Washington. 1996. Fort Totten Tank Closure Report No. 5, Storage Tank #11.
- New York State Department of Environmental Conservation. 1992 Sampling Guidelines and Protocols. Technological Background and Quality Control Quality Assurance for NYSDEC Spill Response Program.
- New York State Department of Environmental Conservation. 1992 STARS Memo #1 Petroleum-Contaminated Soil Guidance Policy.
- New York State Department of Environmental Conservation. 1994 SPOTS Memo # 14 Site Assessment at Bulk Storage Facilities.
- New York State Department of Environmental Conservation. 1994 Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup levels.
- New York State Department of Environmental Conservation. 1993 Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values.
- New York State Department of Environmental Conservation. Guidelines for Exploratory Boring, Monitoring Wells Installation, and Documentation of these Activities.

FIGURES



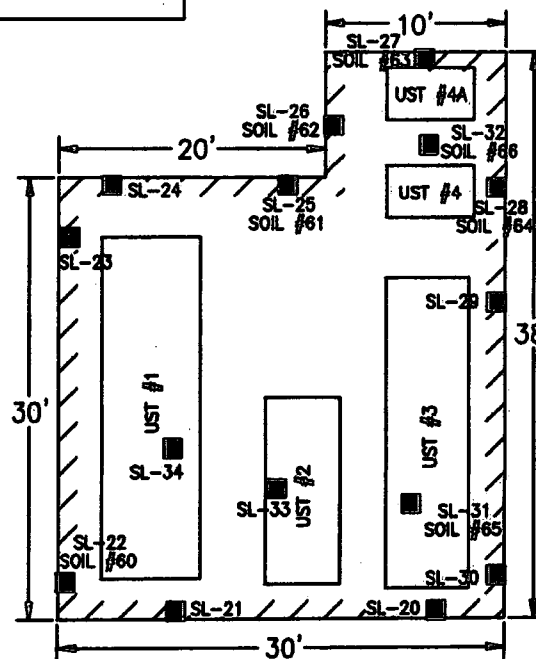
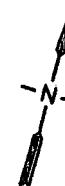
LIGHT POST
(Electric from underground)

6" CONCRETE ISLAND
(Fuel pumps removed)

6" CONCRETE PAD

BUILDING 319

BUILDING 334



TANK GRAVE DEPTH: 8 FEET

LEGEND

■ PREVIOUS SOIL SAMPLE LOCATION (APPROXIMATE)

/// APPROXIMATE LIMITS OF USTs EXCAVATION

NOT TO SCALE



U.S. ARMY ENGINEER DISTRICT, BALTIMORE
CORPS OF ENGINEERS
BALTIMORE, MARYLAND



IT Corporation
2113 Emmorton Park Road
Edgewood, Maryland 21040
(410) 612-6350
A Member of The IT Group

PREPARED BY: PMH

TASK NO: 886706

CHECKED: GZ

IT DWG NO:

DATE: 10-30-00

BLDG334B

FIGURE 5-1

BUILDING 334
FORMER USTs
PREVIOUS SOIL
SAMPLE LOCATIONS

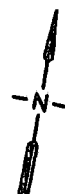
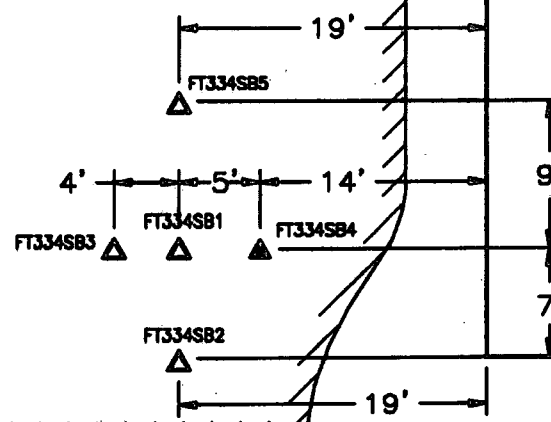
FILE: BLDG334B.dwg PLOTED: 10-30-00

BUILDING
319

BLACKTOP

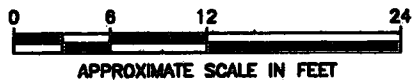
BLACKTOP

BUILDING
334



LEGEND

- △ SOIL SAMPLE LOCATION
- ▲ SOIL SAMPLE AND GROUND-WATER SAMPLE LOCATIONS
- /// EXCAVATION LIMITS

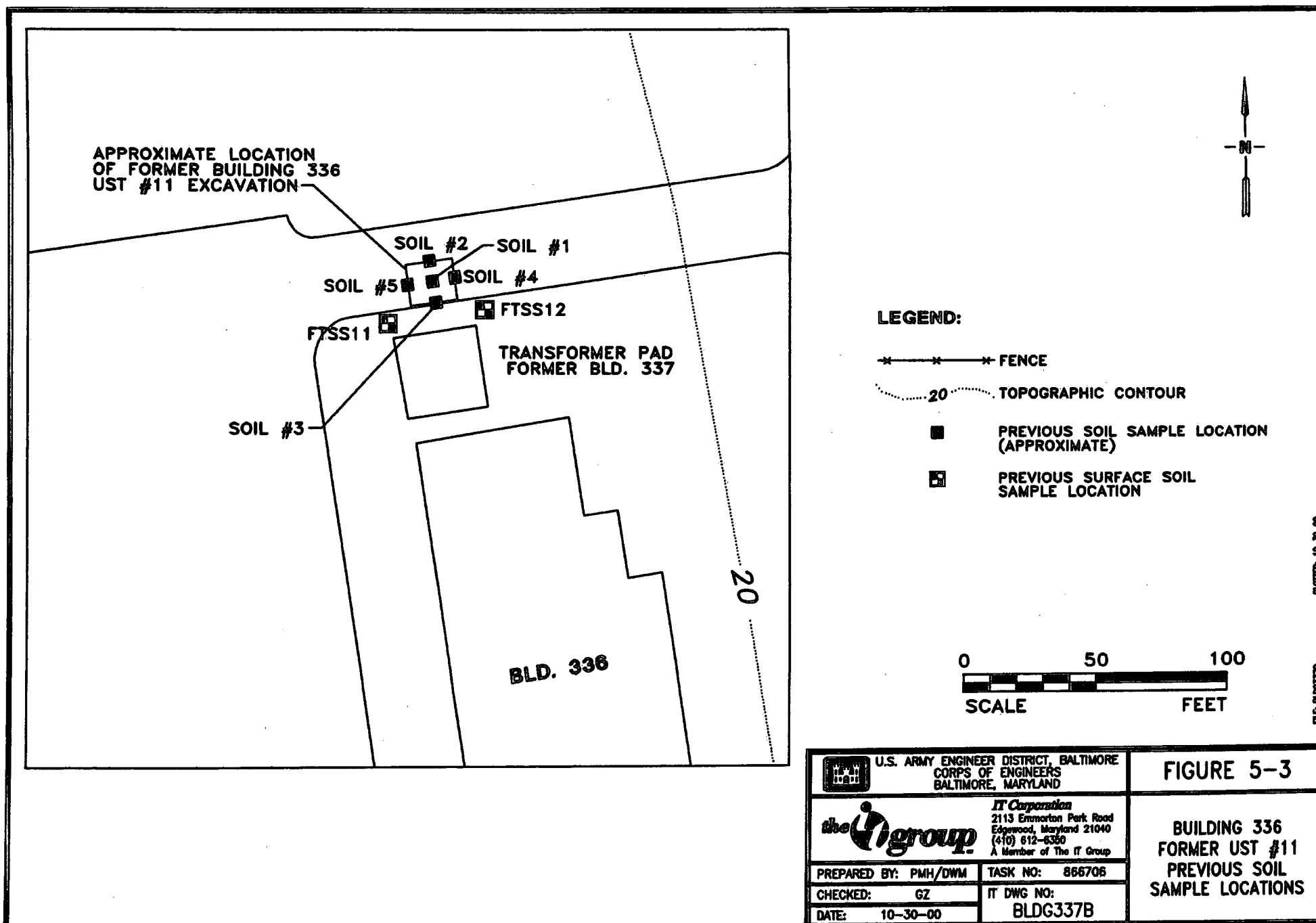


ROAD

BLACKTOP

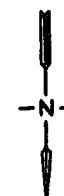
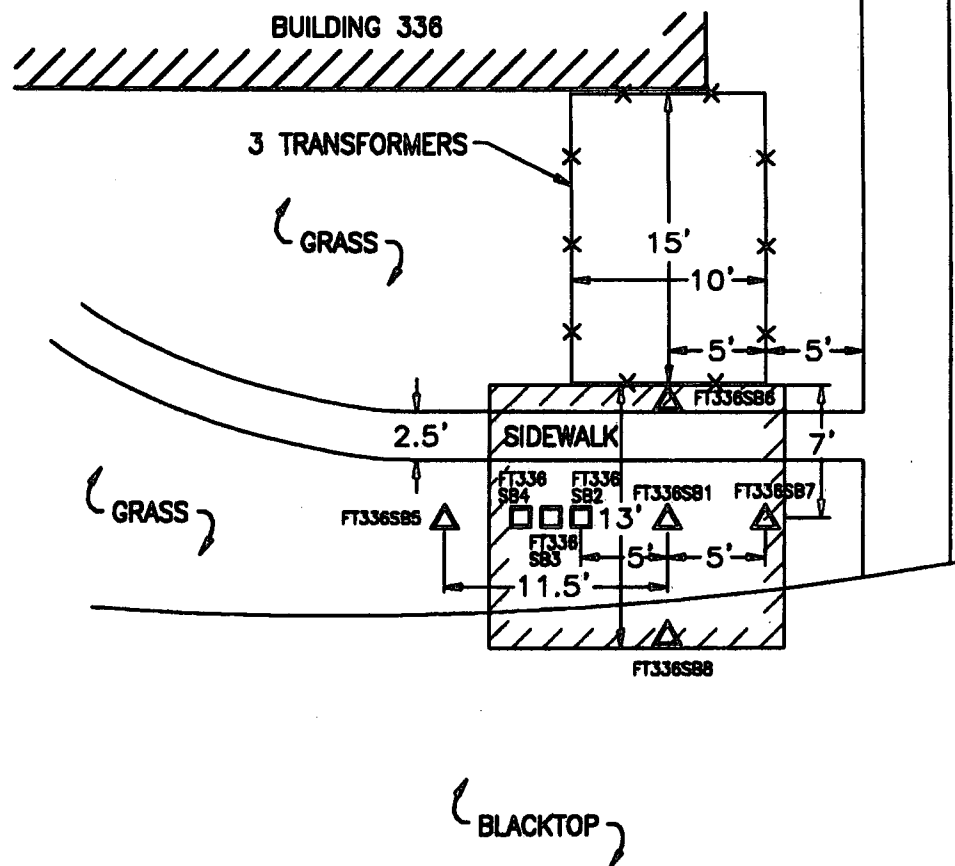
<p>U.S. ARMY ENGINEER DISTRICT, BALTIMORE CORPS OF ENGINEERS BALTIMORE, MARYLAND</p>		<p>FIGURE 5-2</p> <p>BUILDING 334 SOIL AND GROUNDWATER SAMPLE LOCATIONS</p>
<p>IT Corporation 2113 Emmorton Park Road Edgewood, Maryland 21040 (410) 612-8350 A Member of The IT Group</p>		
<p>PREPARED BY: PMH/DWM</p>		<p>TASK NO: 866708</p>
<p>CHECKED: GZ</p>		<p>IT DWG NO: BLDG334-E</p>
<p>DATE: 11-6-00</p>		

FILE BLDG334-E.dwg PLOTED: 11-6-00



PLotted: 10-30-00


FILE BLDG337B



LEGEND

- SOIL BORING
- △ SOIL SAMPLE LOCATION
- ▲ SOIL SAMPLE AND GROUND-WATER SAMPLE LOCATIONS
- /// APPROXIMATE LIMITS OF UST EXCAVATION
- X- FENCE



 U.S. ARMY ENGINEER DISTRICT, BALTIMORE CORPS OF ENGINEERS BALTIMORE, MARYLAND		FIGURE 5-4 BUILDING 336 SOIL BORING AND GROUNDWATER SAMPLE LOCATIONS
<i>the i group</i> IT Corporation 2113 Emmorton Park Road Edgewood, Maryland 21040 (410) 812-8380 A Member of The IT Group		
PREPARED BY: PMH/DWM	TASK NO: 886708	
CHECKED: OZ	IT DWG NO:	
DATE: 11-8-00	BLDG336A	

PLUTER: 11-8-00

FILE: BLDG336A.dwg

TABLES

**TABLE 5-1
FORT TOTTEN
SOIL SAMPLING PROGRAM**

Sample ID	General Location of Soil Sample	Date	Sampling Method	Sample Type	Sampling Depth (ft)	Analysis for Soil Sample
COMP334SB	Building 334	8/22/00	Geoprobe	Composite	FT334SB1(8-9 ft), FT334SB2 (8-9 ft), FT334SB3 (8-9 ft), FT334SB4 (9-10 ft), FT334SB5 (8-9 ft)	VOCs + MTBE, SVOCs
FT334COMP2	Building 334	8/24/00	Geoprobe	Composite	FT334SB4 (20-24 ft), FT334SB5 (20-24 ft)	VOCs + MTBE, SVOCs
COMP336SB	Building 336	8/23/00	Geoprobe	Composite	FT336SB5 (8-9 ft), FT336SB6 (7-9 ft), FT336SB7 (7-12 ft), FT336SB8 (6-9 ft)	VOCs + MTBE, SVOCs
FT336COMP2	Building 336	8/23/00	Geoprobe	Composite	FT336SB5 (16-18 ft), FT336SB6 (14.5-16 ft), FT336SB7 (12-16 ft), FT336SB8 (12-16 ft)	VOCs + MTBE, SVOCs

**TABLE 5-2
FORT TOTTEN
GROUNDWATER SAMPLING PROGRAM**

Sample ID	General Location of Soil Sample	Date	Sampling Method	Sampling Depth (ft bgs)	Analysis for Groundwater Sample
FT334GW4	Building 334	8/24/00	Geoprobe	20-23	VOCs + MTBE, SVOCs

**TABLE 5-3
FORT TOTTEN
SOIL ANALYTICAL DATA**

Sample Area	NYSDEC	Building 334		Building 336	
Sample ID	STARS Memo #1	COMP334SB	FT334COMP2	COMP336SB	FT336COMP2
Sampling Date	TGLP AGV (ppb)	8/22/00	8/24/00	8/23/00	8/23/00
VOCs					
Methyl tert-butyl ether	1000	ND	8	ND	ND
Benzene	14	ND	ND	ND	ND
Toluene	100	ND	ND	ND	ND
n-Propylbenzene	100	1500	ND	70	ND
Isopropylbenzene	100	470	ND	30	ND
Ethylbenzene	100	2300	ND	23	ND
m-Xylene and p-xylene	100	7700	ND	37	ND
o-Xylene	100	1300	ND	6 J	ND
Xylenes, total	100	8800	ND	50	ND
1,3,5-Trimethylbenzene	100	1500	ND	140	ND
tert-Butylbenzene	100	ND	ND	ND	ND
1,2,4-Trimethylbenzene	100	11000	3	420	ND
sec-Butylbenzene	100	ND	ND	96	ND
p-Isopropyltoluene	100	360	ND	100	ND
n-Butylbenzene	100	590	ND	130	ND
Naphthalene	200	1600	ND	370	ND
SVOCs					
Acenaphthene	400	120 J	ND	120 J	ND
Fluorene	1000	160 J	ND	270 J	ND
Phenanthrene	1000	1000	ND	590	ND
Anthracene	1000	230 J	ND	79 J	ND
Fluoranthene	1000	830	ND	180 J	ND
Pyrene	1000	730	ND	220 J	ND
Benz[a]anthracene	0.04	330 J	ND	74 J	ND
Chrysene	0.04	370 J	ND	90 J	ND
Benzo[b]fluoranthene	0.04	190 J	ND	49 J	ND
Benzo[k]fluoranthene	0.04	270 J	ND	65 J	ND
Benzo[a]pyrene	0.04	260 J	ND	58 J	ND
Indeno[1,2,3-cd]pyrene	0.04	110 J	ND	ND	ND

**TABLE 5-3
FORT TOTTEN
SOIL ANALYTICAL DATA**

TCLP AGV: TCLP Alternative Guidance Value (New York State Department of Environmental Conservation Division of Spills Management STARS Memo #1, Petroleum-Contaminated Soil Guidance Policy, August 1992).

ft. bgs: Feet below ground surface.

ND: Analyte not detected.

J: Estimated value; result is less than the sample reporting limit but greater than the method detection limit.

TABLE 5-4
FORT TOTTEN
GROUNDWATER ANALYTICAL DATA

Sample Area		Building 334
Sample ID	NYS GW	FT334GW4
Depth (ft bgs)	Standards/	20-23
Sampling Date	Guidance (ppb)	8/24/00
VOCs		
Methyl tert-butyl ether	NA	360
Benzene	0.7	5600
Toluene	5	2600
n-Propylbenzene	5	170 J
Ethylbenzene	5	2200
m- and p-xylenes	5	3000
o-Xylene	5	660
Xylenes, total	5	4000
1,2,4-Trimethylbenzene	5	800
SVOCs		
Phenanthrene	50	1 J

NYS GW Standards/Guidance: New York State Ambient Water Quality Standards and Guidance Values, October 1993.

J: Estimated value; result is less than the sample reporting limit but greater than the method detection limit.

APPENDIX A
Data Validation Memoranda

MEMORANDUM

TO: Fred Poli

FROM: Eric Malarek

SUBJECT: Fort Totten Data Validation – Volatiles in Soil
Severn Trent Laboratories, Inc.
Order # 001103

DATE: October 24, 2000

The purpose of this memorandum is to present the data validation report for the samples collected at Fort Totten during the August 22-24, 2000 sampling events. Samples were analyzed for volatile organic compounds (VOCs) using USEPA SW-846 Method 5030A/8260B. One soil sample was validated in this report. This sample was also analyzed at a dilution:

IT Sample ID	STL Lab ID
COMP334SB	0009618
COMP334SBDL	0009618DL

Data were reviewed by Eric Malarek and validated using a combination of method-specific criteria, laboratory SOP, and the *USEPA Region II SOP for the Validation of Analytical Data Analyzed by USEPA SW-846 Method 8260B* (December 1997). Parameters evaluated are presented in Table 1. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region II specifications.

Table 1. Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Blank Analysis
	X	Instrument Performance Results
X		Initial Calibration
X		Continuing Calibration
X		System Monitoring Compounds
	X	Laboratory Control Spike
	X	Internal Standards
	X	Matrix Spike and Matrix Spike Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

**FORT TOTTEN VALIDATION REPORT
SOIL VOLATILES REVIEW
SDG 001103**

I-Holding Times

Form I

Holding time criteria: preserved samples, Cool $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 14 days from sample collection to analysis.

- Soil sample COMP334SB was collected on 8/22/00. Sample COMP334SB was analyzed on 8/29/00. The sample was re-analyzed as COMP334SBDL on 9/1/00 due to dilution requirements. All criteria were met. No qualifiers were applied.

II-Blank Analysis

Forms I, IV, and chromatograms

Blanks were evaluated to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. No trip blank was required for soil samples. No rinse blank was collected with the samples associated with this SDG.

- Table 2 summarizes the blank contamination study.

Table 2: Samples Affected Due to VOC Blank Contamination

Analysis Date	QC Blank ID	Compounds	Concentration	Action Level	Sample qualified with "B"
8/29/00	VB008291 (VBLK01) VA1	None	NA	NA	None
9/1/00	VB008314 (VBLK02) VC3	None	NA	NA	None
9/5/00	VB009051 (VBLK03) VA1	None	NA	NA	None

III-Instrument Performance Check

Form V

The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed. The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria.

- All criteria were met. No qualification was applied.

IV-Initial Calibration

Form VI, and chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for volatile target compounds. The percent relative standard deviation (%RSD) and the Relative Response Factor (RRF) should all fall within the control criteria of $\leq 30\%$ and ≥ 0.1 for system performance check compounds (≥ 0.3 for PCA & chlorobenzene), and $\leq 15\%$ and ≥ 0.05 for all other target compounds, respectively. If linear regression is used, the correlation coefficient should be > 0.990 .

- For soil initial calibration performed on 8/25/00 on instrument VA01, all target compounds reported on form 1s met criteria. No qualifiers were applied. Sample COMP334SB was analyzed using this initial calibration.

- For soil initial calibration performed on 8/31/00 on instrument VC03, MTBE (20.4%) and naphthalene (38.0%) were outside of established criteria. Sample COMP334SBDL was analyzed using this initial calibration. For these compounds, all detects were qualified estimated "J" and non-detects "UJ".

V-Continuing Calibration

Form VII, and chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for volatile target compounds. The percent difference (%D) and the Relative Response Factor (RRF) should all fall within the control criteria of $\leq 20\%$ and ≥ 0.05 for calibration check compounds and for all other target compounds. Continuing calibration standards containing both target compounds and surrogates were analyzed at the beginning of each 12-hour analysis.

- For soil continuing calibration performed on 8/25/00 @19:04 on instrument VA01, MTBE (99.8%; RRF 0.002) exceeded criteria among the requested target list. Samples COMP334SB and COMP334SBDL were analyzed using another continuing calibration. No qualifiers were applied.
- For soil continuing calibration performed on 8/29/00 @08:09 on instrument VA01, all target compounds reported on form 1s met criteria. No qualifiers were applied. Sample COMP334SB was analyzed using this continuing calibration.
- For soil continuing calibration performed on 9/5/00 @08:54 on instrument VA01, all target compounds reported on form 1s met criteria. No qualifiers were applied. Samples COMP334SB and COMP334SBDL were analyzed using another continuing calibration.
- For soil continuing calibration performed on 9/1/00 @01:46 on instrument VC03, o-xylenes (25.0%), m&p-xylenes (21.5%), isopropylbenzene (22.9%), and naphthalene (40.8%) exceeded criteria among the requested target list. For these compounds, the samples validated were qualified as estimated "J" for detects and non-detects "UJ". Sample COMP334SBDL was analyzed using this continuing calibration.
- For soil continuing calibration performed on 9/1/00 @12:15 on instrument VC03, naphthalene (22.4%) exceeded criteria among the requested target list. For these compounds, the samples validated were qualified as estimated "J" for detects and non-detects "UJ". Sample COMP334SBDL was analyzed using this continuing calibration.

VI-System Monitoring Compound (Surrogates)

Form II, and chromatograms

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. The surrogates and recovery ranges are:

Dibromofluoromethane	(79-122%)
1,2-dichloroethane-d4	(70-119%)
Toluene-d8	(82-114%)
Bromofluorobenzene	(76-121%)

- Surrogate Toluene-d8 (75%) was outside of control limits for sample COMP334SB. All detects were qualified estimated "J" and non-detects "UJ".

VII-Laboratory Control Spike

chromatograms

Laboratory control spike is evaluated to determine accuracy of the analytical method on various matrices. Specific criteria included: frequency (1 per 20 samples for each matrix), and percent RPD within control criteria.

- Samples VL008291, VL008314, and VL009051 were used as the laboratory control samples. All soil percent recoveries were within control limits. No qualifier was applied.

VIII-Internal Standards (IS)

Form VIII, and chromatograms

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All area counts and retention times were within the control criteria for samples validated. No qualifier was applied.

IX-Matrix Spike/Matrix Spike Duplicate

Form III, and chromatograms

Matrix spike/Matrix spike duplicates are evaluated to determine long-term precision and accuracy of the analytical method on various matrices. Specific criteria included: frequency (1 per 20 samples for each matrix), and percent RPD within control criteria.

- Sample COMP334SBDL was analyzed as MS/MSD. All criteria were met. No qualifiers were applied.

X-Quantitation Verification

Form 1, and chromatograms

The accuracy of analytical results were verified through the calculation of several parameters. The percent difference between the calculated and reported values should be $\leq 10\%$. Any positive value greater than the MDL and less than the RL was reported as estimated "J".

Sample COMP334SBDL for n-propylbenzene,

Reported concentration = 1500 $\mu\text{g/kg}$

$$\text{conc } (\mu\text{g/kg}) = \text{Ax} \cdot \text{Is} \cdot \text{DF} \cdot \text{Ve} \cdot \text{Vf} / \text{Ais} \cdot \text{RRF} \cdot \text{Ws} \cdot \text{FS} \cdot \text{Vi}$$

Where

Ax = the compound area
 Ais = the corresponding internal standard area
 Is = the corresponding internal standard concentration (ng/mL)
 DF = the dilution factor
 RRF = the relative response factor
 Ve = Volume extracted (mL)
 Vf = Volume final (mL)
 Vi = Volume injected (mL)
 Ws = Weight of the sample (g)
 FS = Percent Solids as a fraction

$$\begin{aligned} \text{conc } (\mu\text{g/kg}) &= (125465) \cdot (50\text{ng/mL}) \cdot (1) \cdot (10\text{mL}) \cdot (5\text{ml}) / (949100) \cdot (0.714) \cdot (4.0\text{g}) \cdot (0.1 \text{ ml}) \cdot (0.77) \\ &= 1500 \mu\text{g/kg} \end{aligned}$$

%D = 0.0%

Values were within 10% difference.

MEMORANDUM

TO: Fred Poli

FROM: Eric Malarek

SUBJECT: Fort Totten Data Validation – Volatiles in Water
Severn Trent Laboratories, Inc.
Order # 001103

DATE: October 24, 2000

The purpose of this memorandum is to present the data validation report for the samples collected at Fort Totten during the August 22-24, 2000 sampling events. Samples were analyzed for volatile organic compounds (VOCs) using USEPA SW-846 Method 5030B/8260B. One groundwater sample was validated in this report. This sample was also analyzed at a dilution:

IT Sample ID	STL Lab ID
FT334GW4	0009708
FT334GW4DL	0009708DL

Data were reviewed by Eric Malarek and validated using a combination of method-specific criteria, laboratory SOP, and the *USEPA Region II SOP for the Validation of Analytical Data Analyzed by USEPA SW-846 Method 8260B* (December 1997). Parameters evaluated are presented in Table 1. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region II specifications.

Table 1. Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
X		Holding Times
	X	Blank Analysis
	X	Instrument Performance Results
X		Initial Calibration
X		Continuing Calibration
X		System Monitoring Compounds
	X	Laboratory Control Spike
	X	Internal Standards
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

**FORT TOTTEN VALIDATION REPORT
AQUEOUS VOLATILES REVIEW
SDG 001103**

I-Holding Times

Form I

Holding time criteria: preserved samples, Cool 4°C±2°C, HCl pH<2; 14 days from sample collection to analysis.

- Groundwater sample FT334GW4 was collected on 8/24/00. Sample FT334GW4 was analyzed on 9/3/00. The sample was re-analyzed as FT334GW4DL on 9/10/00 due to dilution requirements, three days out of holding time. This sample was qualified estimated "J" for detects and "UJ" for non-detects.

II-Blank Analysis

Forms I, IV, and chromatograms

Blanks were evaluated to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. No rinse blank was collected with the samples associated with this SDG.

- Table 2 summarizes the blank contamination study.

Table 2: Samples Affected Due to VOC Blank Contamination

Analysis Date	QC Blank ID	Compounds	Concentration	Action Level	Sample qualified with "B"
9/1/00	VB009016 (VBLK01) VE5	None	NA	NA	None
9/3/00	VB009031 (VBLK02) VE5	None	NA	NA	None
9/10/00	VB009101 (VBLK03) VA1	None	NA	NA	None
9/1/00	FTTB082400	None	NA	NA	None

III-Instrument Performance Check

Form V

The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed. The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria.

- All criteria were met. No qualification was applied.

IV-Initial Calibration

Form VI, and chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for volatile target compounds. The percent relative standard deviation (%RSD) and the Relative Response Factor (RRF) should all fall within the control criteria of ≤30% and ≥0.1 for system performance check compounds (≥0.3 for PCA & chlorobenzene), and ≤15% and ≥0.05 for all other target compounds, respectively. If linear regression is used, the correlation coefficient should be >0.990.

- For aqueous initial calibration performed on 8/31/00 on instrument VA01, all target compounds reported on form 1s met criteria. No qualifiers were applied. Sample FT334GW4DL was analyzed using this initial calibration.

- For aqueous initial calibration performed on 9/1/00 on instrument VE05, MTBE (16.8%), tert-butylbenzene (16.9%), and naphthalene (41.9%) were outside of established criteria. Sample FT334GW4 was analyzed using this initial calibration. For these compounds, all detects were qualified estimated "J" and non-detects "UJ".

V-Continuing Calibration

Form VII, and chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for volatile target compounds. The percent difference (%D) and the Relative Response Factor (RRF) should all fall within the control criteria of $\leq 20\%$ and ≥ 0.05 for calibration check compounds and for all other target compounds. Continuing calibration standards containing both target compounds and surrogates were analyzed at the beginning of each 12-hour analysis.

- For aqueous continuing calibration performed on 8/31/00 @17:23 on instrument VA01, MTBE (100.0%; RRF=0.000) and naphthalene (28.8%) exceeded criteria among the requested target list. Samples FT334GW4 and FT334GW4DL were analyzed using another continuing calibration. No qualifiers were applied.
- For aqueous continuing calibration performed on 9/10/00 @06:35 on instrument VA01, MTBE (26.5%) exceeded criteria among the requested target list. Sample FT334GW4DL was analyzed using this continuing calibration. For this compound, the sample validated was qualified as estimated "J" for detects and non-detects "UJ".
- For aqueous continuing calibration performed on 9/1/00 @16:23 on instrument VE05, MTBE (99.7%; RRF=0.001) exceeded criteria among the requested target list. Samples FT334GW4 and FT334GW4DL were analyzed using another continuing calibration. No qualifiers were applied.
- For aqueous continuing calibration performed on 9/1/00 @17:57 on instrument VE05, all target compounds reported on form 1s met criteria. Samples FT334GW4 and FT334GW4DL were analyzed using another continuing calibration. No qualifiers were applied.
- For aqueous continuing calibration performed on 9/3/00 @18:44 on instrument VE05, MTBE (37.9%) and isopropylbenzene (21.0%) exceeded criteria among the requested target list. Sample FT334GW4 was analyzed using this continuing calibration. For these compounds, the samples validated were qualified as estimated "J" for detects and non-detects "UJ".

VI-System Monitoring Compound (Surrogates)

Form II, and chromatograms

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. The surrogates and recovery ranges are:

Dibromofluoromethane	(86-118%)
1,2-dichloroethane-d4	(76-114%)
Toluene-d8	(88-110%)
Bromofluorobenzene	(86-115%)

- Surrogates dibromofluoromethane (178%), 1,2-dichloroethane-d4 (123%), and bromofluorobenzene (156%) were outside of control limits for sample FT334GW4. All detects were qualified estimated "J" and non-detects "UJ".

VII-Laboratory Control Spike chromatograms

Laboratory control spike is evaluated to determine accuracy of the analytical method on various matrices. Specific criteria included: frequency (1 per 20 samples for each matrix), and percent RPD within control criteria.

- Samples VL009016, VL009031, VD009031, VL009101, and VD009101 were used as the laboratory control samples. All aqueous percent recoveries were within control limits. No qualifier was applied.

VIII-Internal Standards (IS) Form VIII, and chromatograms

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All area counts and retention times were within the control criteria for samples validated. No qualifier was applied.

IX-Quantitation Verification Form 1, and chromatograms

The accuracy of analytical results were verified through the calculation of several parameters. The percent difference between the calculated and reported values should be $\leq 10\%$. Any positive value greater than the MDL and less than the RL was reported as estimated "J".

Sample COMP334SBDL for m&p xylenes,

Reported concentration = 3000 $\mu\text{g/L}$,

$$\text{Conc. } (\mu\text{g/L}) = (\text{Ax} \cdot \text{Is } \mu\text{g/L} \cdot \text{DF}) / (\text{Ais} \cdot \text{RF})$$

where:

Ax is the compound area

Is is the amount of internal standard concentration ($\mu\text{g/L}$)

DF is the dilution factor

Ais is the corresponding internal standard area

RF is the average response factor.

$$\text{Conc. } \mu\text{g/L} = (4070737 \cdot 10 \mu\text{g/L} \cdot 200) / (4477351 \cdot 0.607) = 3000 \mu\text{g/L}$$

$$\%D = 0.0\%$$

Values were within 10% difference.

MEMORANDUM

TO: Fred Poli

FROM: Eric Malarek

SUBJECT: Fort Totten Data Validation – Semivolatiles in Soil
Severn Trent Laboratories, Inc.
Order # 001103

DATE: October 25, 2000

The purpose of this memorandum is to present the data validation report for the samples collected at Fort Totten during the August 22-24, 2000 sampling events. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW-846 Method 8270C. One soil sample was validated in this report:

IT Sample ID	STL Lab ID
COMP334SB	0009618

Data were reviewed by Eric Malarek and validated using a combination of method-specific criteria, laboratory SOP, and the *USEPA Region II SOP for Validation of SW-846 Method 8270B* (February, 1995). Parameters evaluated are presented in Table 1. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region II specifications.

Table 1. Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Blank Analysis
	X	Instrument Performance Results
X		Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
	X	Internal Standards
	X	Laboratory Control Standard
	X	Matrix Spike/Matrix Spike Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

**FORT TOTTEN VALIDATION REPORT
SOIL SEMI-VOLATILES REVIEW
SDG 001103**

I-Holding Times

Form I

Holding time criteria: preserved samples, Cool $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 14 days from sample collection to extraction and 40 days from extraction to analysis.

- Soil sample COMP334SB was collected on 8/22/00. Sample COMP334SB was extracted on 8/29/00 and analyzed on 9/8/00. All criteria were met. No qualifiers were applied.

II-Blank Analysis

Forms I, IV, and chromatograms

Blanks were evaluated to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. No rinse blank was collected with samples associated with this SDG.

- Table 2 summarizes the blank contamination and qualifications. No qualifications were required due to blank criteria.

Table 2: Samples Affected Due to SVOC Blank Contamination

Instrument ID	Analysis Date	QC Blank ID	Compounds	Conc. (ug/L)	Action Level (ug/L)	Samples qualified with "B"
SB2	9/3/00	SB008281	None	None	None	None
SD4	9/7/00	SB008291	None	None	None	None

III-Instrument Performance Check

Form V, chromatograms

The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

IV-Initial Calibration

Form VI, chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. All percent relative standard deviations should be less than 30% for CCCs and 15% for other compounds. The relative response factors should be greater than 0.05. If linear regression is used, the correlation coefficient should be >0.990 .

- For calibration performed on 9/3/00 on instrument SB2, all reported compounds were within specified criteria. No qualifiers were applied. Sample COMP334SB was not analyzed using this initial calibration.
- For calibration performed on 8/22/00 on instrument SD4, fluorene (15.6%) exceeded the criteria. All positive values were qualified as estimated "J" and non-detects no qualifier. Sample COMP334SB was analyzed using this initial calibration.

V-Continuing Calibration

Form VII, and chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semi-volatile target compounds. Continuing calibration standards containing both target compounds and surrogates were analyzed at the beginning of each 12-hour analysis. All percent differences should be less than 20%.

- For the continuing calibration performed on 9/3/00 @14:55 on instrument SB2, all criteria were met for reported compounds. Sample COMP334SB was analyzed using another continuing calibration. No qualifiers were applied.
- For the continuing calibration performed on 8/22/00 @20:23 on instrument SD4, chrysene (20.9%) was outside criteria. Sample COMP334SB was analyzed using another continuing calibration. No qualifiers were applied.
- For the continuing calibration performed on 9/7/00 @09:11 on instrument SD4, all criteria were met for reported compounds. Sample COMP334SB was analyzed using this continuing calibration. No qualifiers were applied.
- For the continuing calibration performed on 9/8/00 @09:04 on instrument SD4, all criteria were met for reported compounds. Sample COMP334SB was analyzed using this continuing calibration. No qualifiers were applied.

VI-Surrogate Spikes

Form II, and chromatograms

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. The surrogates and recovery ranges are:

Nitrobenzene-d5	(23-120%)
2-Fluorobiphenyl	(30-115%)
Terphenyl-d14	(18-137%)

- For sample COMP334SB, all surrogates were within control limits. No qualifiers were applied.

VII-Internal Standards (IS)

Form VIII, and chromatograms

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (\pm 30 seconds) from that of the associated calibration standard.

- All criteria were met for sample COMP334SB. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS)

LCSs are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds.

- Samples SL008281 and SL008291 were used as the laboratory control samples. All soil percent recoveries were within control limits. No qualifiers were applied.

IX-Matrix Spike/Matrix Spike Duplicate

Form III, and chromatograms

Matrix spike/Matrix spike duplicates are evaluated to determine long-term precision and accuracy of the analytical method on various matrices. Specific criteria included: frequency (1 per 20 samples for each matrix), and percent recoveries and RPD within control criteria.

- Sample FT334COMP2 and FT336COMP2 were analyzed as MS/MSD. MS/MSD recoveries were within control limits for spiked compounds. No qualifiers were applied.

X-Quantitation Verification

Form 1, and chromatograms

The accuracy of analytical results were verified through the calculation of several parameters. All values were within 10%. Any value reported below the reporting limit and above the MDL should be considered as estimated "J".

Sample COMP334SB for anthracene,

$$\text{conc. (ug/kg).} = (A_x) \cdot (I_s) \cdot (V_t) \cdot (DF) / (A_{is}) \cdot (\text{Avg. RF}) \cdot (W_s) \cdot (V_i) \cdot (\text{fraction solids})$$

where:

A_x is the compound area

A_{is} is the corresponding internal standard area

I_s is the corresponding internal standard concentration (ng)

V_t is the volume of total extract (mL)

DF is the dilution factor

Avg. RF is the average relative response factor

V_i is the volume of the extract injected (uL)

W_s is the weight of sample extracted (g).

$$= (51931) \cdot (40 \text{ ng}) \cdot (1000 \text{ mL}) \cdot (1) / (389638) \cdot (0.993) \cdot (30 \text{ g}) \cdot (1.0 \text{ uL}) \cdot (0.77) = 232 \text{ ug/kg}$$

Reported Value = 230 ug/kg

% Difference = 1.0%

MEMORANDUM

TO: Fred Poli

FROM: Eric Malarek

SUBJECT: Fort Totten Data Validation – Semivolatiles in Water
Severn Trent Laboratories, Inc.
Order # 001103

DATE: October 25, 2000

The purpose of this memorandum is to present the data validation report for the samples collected at Fort Totten during the August 22-24, 2000 sampling events. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW-846 Method 8270C. One groundwater sample was validated in this report:

IT Sample ID	STL Lab ID
FT334GW4	0009708

Data were reviewed by Eric Malarek and validated using a combination of method-specific criteria, laboratory SOP, and the *USEPA Region II SOP for Validation of SW-846 Method 8270B* (February, 1995). Parameters evaluated are presented in Table 1. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region II specifications.

Table 1. Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Blank Analysis
	X	Instrument Performance Results
	X	Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
	X	Internal Standards
	X	Laboratory Control Standard
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

**FORT TOTTEN VALIDATION REPORT
AQUEOUS SEMI-VOLATILES REVIEW
SDG 001103**

I-Holding Times

Form I

Holding time criteria: preserved samples, Cool $4^{\circ}\text{C}\pm 2^{\circ}\text{C}$, 7 days from sample collection to extraction and 40 days from extraction to analysis.

- Groundwater sample FT334GW4 was collected on 8/24/00. Sample FT334GW4 was extracted on 8/29/00 and analyzed on 9/7/00. All criteria were met. No qualifiers were applied.

II-Blank Analysis

Forms I, IV, and chromatograms

Blanks were evaluated to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. No rinse blank was collected with samples associated with this SDG.

- Table 2 summarizes the blank contamination and qualifications. No qualifications were required due to blank criteria.

Table 2: Samples Affected Due to SVOC Blank Contamination

Instrument ID	Analysis Date	QC Blank ID	Compounds	Conc. (ug/L)	Action Level (ug/L)	Samples qualified with "B"
SD4	9/6/00	SB008292	None	None	None	None

III-Instrument Performance Check

Form V, chromatograms

The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

IV-Initial Calibration

Form VI, chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. All percent relative standard deviations should be less than 30% for CCCs and 15% for other compounds. The relative response factors should be greater than 0.05. If linear regression is used, the correlation coefficient should be >0.990 .

- For calibration performed on 8/22/00 on instrument SD4, fluorene (15.6%) exceeded the criteria. All positive values were qualified as estimated "J" and non-detects no qualifier. Sample FT334GW4 was analyzed using this initial calibration and was non-detect for fluorene.

V-Continuing Calibration

Form VII, and chromatograms

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semi-volatile target compounds. Continuing calibration standards containing both target compounds and surrogates were analyzed at the beginning of each 12-hour analysis. All percent differences should be less than 20%.

- For the continuing calibration performed on 8/22/00 @20:23 on instrument SD4, chrysene (20.9%) was outside criteria. Sample FT334GW4 was analyzed using another continuing calibration. No qualifiers were applied.
- For the continuing calibration performed on 9/6/00 @10:14 on instrument SD4, all criteria were met for reported compounds. Sample FT334GW4 was analyzed using this continuing calibration. No qualifiers were applied.
- For the continuing calibration performed on 9/7/00 @09:11 on instrument SD4, all criteria were met for reported compounds. Sample FT334GW4 was analyzed using this continuing calibration. No qualifiers were applied.

VI-Surrogate Spikes

Form II, and chromatograms

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. The surrogates and recovery ranges are:

Nitrobenzene-d5	(59-100%)
2-Fluorobiphenyl	(68-96%)
Terphenyl-d14	(68-101%)

- For sample FT334GW4, surrogate Terphenyl-d14 (21%) was outside control limits. Since the other two surrogates were within criteria, no qualifiers were applied based upon this outlier.

VII-Internal Standards (IS)

Form VIII, and chromatograms

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (\pm 30 seconds) from that of the associated calibration standard.

- All criteria were met for sample FT334GW4. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS)

LCSs are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds.

- Samples SL008292 was used as the laboratory control sample. All aqueous percent recoveries were within control limits. No qualifiers were applied.

IX-Quantitation Verification

Form 1, and chromatograms

The accuracy of analytical results were verified through the calculation of several parameters. All values were within 10%. Any value reported below the reporting limit and above the MDL should be considered as estimated "J".

Sample FT334GW4 for naphthalene,

$$\text{conc. (ug/L)} = (A_x) \cdot (I_s) \cdot (V_t) \cdot (DF) / (A_{is}) \cdot (\text{Avg. RF}) \cdot (V_s) \cdot (V_i)$$

where:

A_x is the compound area

A_{is} is the corresponding internal standard area

I_s is the corresponding internal standard concentration (ng)

V_t is the volume of total extract (uL)

DF is the dilution factor

Avg. RF is the average relative response factor

V_i is the volume of the extract injected (uL)

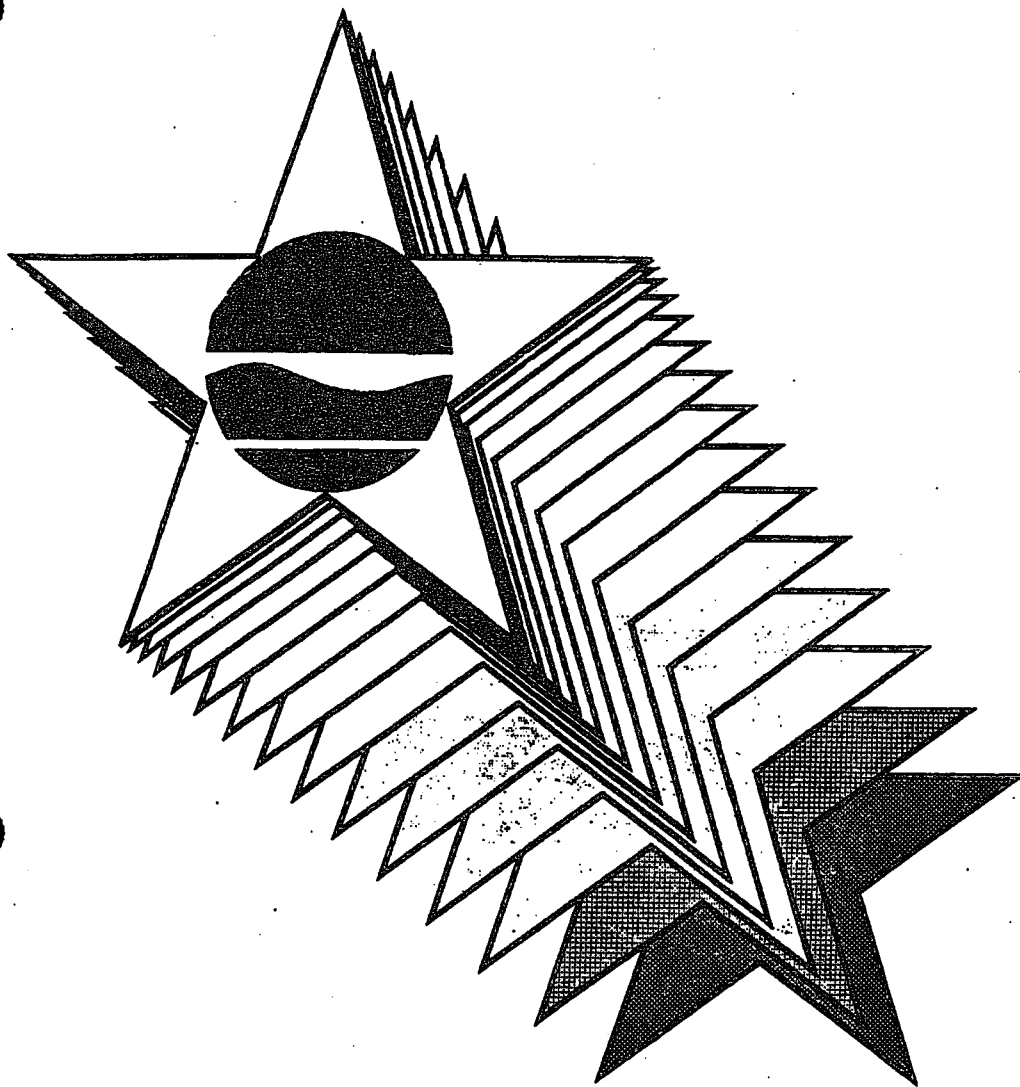
V_s is the volume of sample extracted (mL).

$$= (952391) \cdot (40 \text{ ng}) \cdot (1000 \text{ uL}) \cdot (1) / (383401) \cdot (0.950) \cdot (980 \text{ mL}) \cdot (1.0 \text{ uL}) = 107 \text{ ug/L}$$

Reported Value = 110 ug/L

% Difference = 3.1%

APPENDIX B
NYSDEC STARS Memo #1 Soil Guidance and
Ambient Water Quality Standards and Guidance Values



**Spill
Technology
And
Remediation
Series**

STARS Memo #1
Petroleum-Contaminated Soil Guidance Policy

Prepared by:
New York State Department of Environmental Conservation
Division of Spills Management

August 1992
(Reprinted July 1993)

NEW YORK STATE PETROLEUM-CONTAMINATED SOIL GUIDANCE

Table of Contents

<u>Section</u>	<u>Page</u>
I. PURPOSE AND APPLICABILITY	1
II. HAZARDOUS WASTE DETERMINATION	3
III. SOIL CLEANUP GUIDELINES	
A. Protection of Groundwater	5-7
B. Protection of Human Health	7
C. Protection of Fish and Wildlife	8
D. Protection Against Objectionable Nuisance Characteristic ...	8
Petroleum-Type Odors	8
Contaminant Concentrations	8
IV. GUIDANCE VALUES	
A. Gasoline-Contaminated Soil	9-10
B. Fuel Oil-Contaminated Soil	10-12
V. LABORATORY ANALYSIS	13-14
VI. SAMPLING	
A. Tank Pit	15
B. Soil Pile	16
C. Processed Soil	16-17
D. Aboveground (Ex-Situ) Treatment	17
E. Non-Excavated (In-Situ) Treatment	17
VII. MANAGEMENT OF EXCAVATED (EX-SITU) CONTAMINATED SOIL	
A. Soils Which Do Not Meet Guidance Values	19
1) Reuse Under Specific Beneficial Use Determinations ..	19
2) Disposal at an Authorized Landfill	20
3) Treatment on Site	20-21
B. Soils Which Meet Guidance Values	21
1) Reuse as Construction Material	22
2) Returned to the Original Excavation	22
3) Placed Elsewhere On Site	22
4) Reuse Off-Site at Pre-Approved Location	22

Table of Contents (Cont'd)

<u>Section</u>	<u>Page</u>
C. Rock Debris	23
VIII. MANAGEMENT OF NON-EXCAVATED (IN-SITU) CONTAMINATED SOIL	25
IX. REFERENCES	27
APPENDIX A - HAZARDOUS WASTE DETERMINATION AND REGULATORY LEVELS	A1-A5
Hazardous Waste Regulatory Levels For Toxicity Characteristics ..	A4-A5
APPENDIX B - GUIDANCE VALUES AND REUSE OPTIONS	
TABLE 1 - Guidance Values For Gasoline Contaminated Soil	B-1
TABLE 2 - Guidance Values For Fuel Oil Contaminated Soil	B2-B3
TABLE 3 - Soil Reuse Options	B4

SECTION I

PURPOSE AND APPLICABILITY

The goal at each petroleum spill site is to remove the spilled petroleum product from the soil in the most efficient and safe manner in order that the soil may be returned to a reusable product. When complete removal is not possible, practical, or cost effective, the objective is to remediate the contaminated media to concentration levels which will protect groundwater, human health and the environment.

The Petroleum-Contaminated Soil Guidance Policy is intended to provide direction on the handling, disposal and/or reuse of non-hazardous petroleum-contaminated soils. The reuse or disposal options for excavated soils vary depending on the level of treatment provided consistent with protecting the public health and the environment. While this document does not establish standards, it is intended as guidance in determining whether soils have been contaminated to levels which require investigation and remediation.

This document also constitutes a determination of beneficial use by the Department, as defined in Solid Waste Regulation NYCRR Part 360. Petroleum-contaminated soil, if determined to satisfy the criteria herein, can be reused or disposed of as directed in this guidance. Therefore, soils which meet beneficial use conditions are no longer a solid waste in accordance with NYCRR Part 360-1.2(a)(4).

This guidance is intended for Regional Spill Investigators, Regional Solid Waste staff and responsible parties to assist them in determining the acceptability of remedial activities at a petroleum spill site or in determining the acceptability of a site assessment. It may be applied to both excavated and non-excavated material. The evaluation method and guidance values included in this guidance may be used to determine the limits of contamination, such as defining the extent of contamination in an excavation which contains contaminated material. Situations may exist where results of sampling analysis will require interpretations or subjective judgement, as with certain nuisance characteristics such as odors. These interpretations and judgements will be made solely by the DEC representative on site. There may be instances where the DEC will opt to digress from this guidance to establish cleanup goals reflecting site-specific circumstances at a particular petroleum spill site.

The guidance may also be used by responsible parties to develop corrective action plans which will achieve the criteria set forth in this document.

Robert G. Hampston
Director
Division of Construction Management

Norman H. Nosenchuck
Director
Division of Solid Waste

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SECTION II

HAZARDOUS WASTE DETERMINATION

An initial determination¹ must be made on all excavated petroleum-contaminated soil as to whether or not it is a hazardous waste. The hazardous waste determination typically involves laboratory analysis to quantify contaminant concentrations in the waste material. The DEC and EPA regulations, however, allow the generator of the waste to use knowledge of the waste and/or laboratory analysis to make a hazardous waste determination. Petroleum-contaminated soils are generally stored on site while laboratory analysis results are obtained and evaluated. As long as the material is segregated from the environment by impervious material, such as polyethylene sheeting, the petroleum-contaminated soil may remain on site until appropriate laboratory results are available and interpreted.

A petroleum-contaminated soil is considered a characteristic hazardous waste when it exhibits any of the following characteristics: ignitability, corrosivity, reactivity, or toxicity, as defined in 6NYCRR Part 371, Section 371.3, or 40 CFR Section 261. Knowledge of soils contaminated with virgin petroleum products indicates that those waste materials do not demonstrate ignitability, corrosivity, or reactivity characteristics. Therefore, the only characteristic of concern for virgin petroleum-contaminated soil is toxicity. The Toxicity Characteristic (TC) Rule identifies benzene and lead as compounds which may cause petroleum-contaminated waste to be hazardous. Analysis of additional parameters may be necessary for petroleum-contaminated soil located at sites where other contaminants may be present. Refer to Appendix A for more specific information regarding the procedures for hazardous waste determination, and the TC Rule regulatory levels.

If the contaminated soil has been excavated and if the hazardous waste criteria apply, then the contaminated soil is classified as a hazardous waste. Excavated soil which is hazardous due to any non-petroleum component will be referred to the Division of Hazardous Waste Remediation, and the Division of Hazardous Substances Regulation to determine appropriate remedial actions.

If in-situ soil is contaminated by a petroleum product, and if the above hazardous waste criteria are met, the site will be remediated under the direction of the Bureau of Spill Prevention and Response to provide for protection of human health and environmental quality. In-situ soil, which violates any of the hazardous waste criteria due to any non-petroleum component, will be referred to the Division of Hazardous Waste Remediation, and the Division of Hazardous Substances Regulation to determine appropriate remedial actions.

¹In-situ or excavated soils which could contain contaminants other than petroleum products, by virtue of laboratory analysis, site history, visual observations, etc., will be sampled and analyzed by either the responsible party or by the Bureau of Spill Prevention and Response (BSPR). The Division of Hazardous Substances Regulation (DHSR) will provide assistance to BSPR staff (for state-funded projects) and responsible parties in making hazardous waste determinations for their generated waste.

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SECTION III

SOIL CLEANUP GUIDELINES

There are four essential guidelines which must be satisfied in order for soil to be considered acceptably remediated or not sufficiently contaminated. These are: A) protection of the groundwater; B) protection of human health; C) protection of fish and wildlife and the environment in which they live; and D) protection against objectionable nuisance characteristics. Compliance with these guidelines is satisfied by analysis of soil samples for contaminant concentrations and leachability, and subsequent comparison of the sampling results to guidance values, values which have been determined to be acceptable by DEC.

Contaminant concentrations are determined using EPA standard Methods 8021 or 8270. Leachability is determined using a procedure known as the Toxicity Characteristic Leaching Procedure (TCLP). Satisfactory protection of groundwater is indicated by TCLP Extraction Guidance Values or by TCLP Alternative Guidance Values. Satisfactory protection of human health is indicated by Human Health Guidance Values. Satisfactory protection of water body sediment is indicated by Sediment Guidance Values. Finally, satisfactory protection against objectionable nuisance characteristics is indicated by the lack of odor and by each contaminant concentration being less than 10,000 ppb. Tables 1 and 2 in Section VIII list the contaminants of concern and their corresponding guidance values for acceptable soil concentrations for components of gasoline and fuel oil, respectively. Analysis of additional parameters may be necessary for petroleum-contaminated soil located at sites where other contaminants may be present.

The procedures used when evaluating soil samples to satisfy these guidelines are discussed further in this section.

A. Protection of Groundwater

The presence of a contaminant in the soil does not determine its potential for groundwater contamination. Soil particles can adsorb contaminants which will not be released through infiltration and groundwater recharge mechanisms. Therefore, it is the leachability of the soil which must be measured. To be protective of groundwater quality, the soil must not leach contaminants to the groundwater at concentrations which violate groundwater standards. The Toxicity Characteristic Leaching Procedure (TCLP) has been accepted by the Department² as a method of determining leachability of petroleum-contaminated soil.

The Toxicity Characteristic Leaching Procedure (TCLP) is an extraction process designed to address the leaching potential of organic and inorganic contaminants. It is used to simulate the actual site-specific leaching potential of individual contaminants present in the soil. In the extraction process, the soil sample is mixed with an acid solution and shaken for approximately eighteen

²Accepted by NYSDEC Cleanup Standards Task Force.

hours. For non-volatile organic and inorganic compounds, the soil/acid solution is filtered to produce an extract liquid. For volatile organic compounds, the soil/acid solution is held in a Zero Headspace Extractor (ZHE), preventing the escape of volatile organics, and a liquid extract is squeezed out of the soil/acid solution. The extracted liquid is then analyzed to determine the concentration of the petroleum compounds in question. If the concentrations in the extract are less than or equal to the groundwater standards, then the soil may be considered environmentally acceptable for groundwater protection. Tables 1 and 2 in Appendix B identify the TCLP Extraction Guidance Values for the primary components of gasoline and fuel oil. The tabulated TCLP Extraction Guidance Values are equal to the NYSDEC groundwater standards or the NYSDOH drinking water standards, whichever is more stringent.

An alternative approach to the actual extraction process of the TCLP laboratory procedure which may be a cost-saving shortcut is to evaluate the concentration of the contaminant in the soil and mathematically determine if it will satisfy the leachate criteria. The TCLP laboratory procedure requires the soil sample to be diluted by a ratio of 20:1 when preparing the sample for the acidic extraction, and subsequent leachate analysis. Assuming that the entire mass of the contaminants present in the soil will leach out during the extraction process, the dilution factor of 20 can be applied to the actual soil contaminant concentration to give a maximum possible contaminant concentration obtainable in the leachate.

If a contaminant concentration in the soil is known, then the maximum possible contaminant concentration in the TCLP extract can be determined by the following equation:

$$\left[\begin{array}{l} \text{Contaminant} \\ \text{Concentration} \\ \text{in Soil} \\ \text{(ug/kg or ppb)} \end{array} \right] \div 20 = \left[\begin{array}{l} \text{Maximum Possible} \\ \text{Contaminant} \\ \text{Concentration} \\ \text{in Extract} \\ \text{Liquid (ug/l or ppb)} \end{array} \right]$$

If the maximum possible contaminant concentration in the extract liquid, as determined by the above equation, is less than or equal to the contaminant's TCLP Extraction Guidance Value, then the contaminant satisfies the groundwater quality protection criterion. If the calculated maximum possible contaminant concentration in the extract liquid is greater than the TCLP Extraction Guidance Value, then no conclusion can be drawn and groundwater quality protection must be confirmed by actually performing the TCLP extraction for that contaminant.

Example:

If the total concentration of Toluene in the soil as determined by Method 8021 is 100 ug/kg or 100 ppb for Sample A and 140 ug/kg or 140 ppb for

Sample B, and the groundwater standard is 5 ppb then:

Sample A is: $100 \text{ ug/kg} \div 20 = 5 \text{ ug/l} = 5 \text{ ppb}$

Sample B is: $140 \text{ ug/kg} \div 20 = 7 \text{ ug/l} > 5 \text{ ppb}$

Sample A is considered to have satisfied groundwater protection by the TCLP extraction test for Toluene at 5 ppb. In Sample B, the calculated extract value is greater than 5 ug/l, therefore, no conclusion can be drawn from the calculation, and an actual TCLP extraction test must be performed.

To simplify this alternative approach, TCLP Alternative Guidance Values, which are equal to 20 times the TCLP Extraction Guidance Values, have been included in Tables 1 and 2. Therefore, if a contaminant's soil concentration is known, it can simply be compared to the TCLP Alternative Guidance Values.

The above methodology can also be used to make the hazardous waste determination, with the soil or sediment concentration compared to the respective hazardous waste limit for the leachate. A considerable decrease in analytical costs may be realized if the above equation is used to evaluate contaminant concentration acceptability.

In summary, if the contaminant concentrations in the soil are less than or equal to the TCLP Alternative Guidance Values, or if the contaminant concentrations in the soil extract are less than or equal to the TCLP Extraction Guidance Values, then the soil is considered environmentally acceptable for groundwater quality protection.

B. Protection of Human Health

Protection of human health is an essential requirement of both treatment and reuse of petroleum-contaminated soil. EPA has published health-based standards for many contaminants in soil. The standards are contained in the Health Effects Assessment Summary Table (HEAST REPORT). These standards were derived from methodologies based on soil ingestion values for carcinogens and systemic toxicants.

The appropriate health-based soil Guidance Values are listed in Tables 1 and 2 for the primary components of gasoline and fuel oil.

If the contaminant concentrations in the soil are less than or equal to the Human Health Guidance Values, then the soil is considered safe for human health concerns.

C. Protection of Fish and Wildlife

Protection of fish and wildlife must be satisfied when dealing with contaminated sediment. Some Sediment Guidance Values for protection of aquatic life and animals which consume aquatic life, have been developed and are noted in Tables 1 and 2. Where sediments are contaminated, these Guidance Values should be used. The appropriate natural resource division (eg. Marine, Fish & Wildlife, etc.) should be contacted for situations involving sediment contaminants which do not have tabulated Sediment Guidance Values. If a spill has occurred at a location that may be sensitive to wildlife (eg. wetlands), the Division of Fish and Wildlife should be consulted to determine whether the soil cleanup levels are adequate for natural resource protection.

If the contaminant concentrations in the sediment are less than or equal to the tabulated Sediment Guidance Values, then the sediment is considered environmentally acceptable for fish and wildlife concerns.

D. Protection Against Objectionable Nuisance Characteristics

Petroleum-contaminated soil must not exhibit objectionable nuisance characteristics to be eligible for some reuse options described later in this guidance and listed in Table 3.

1) Petroleum-Type Odors

The soil must not exhibit any discernible petroleum-type odors in order to be considered for the reuse options identified later in this guidance. Odor determinations for state-funded spill projects will be made by the Regional Spill Investigator. Odor determinations for responsible party (RP) sites are the responsibility of the RP. The Regional Spill Investigator may or may not be available to assess the odor criteria at all sites. When the Regional Spill Investigator is on-site, he/she may override the decision of the RP if, in the investigator's opinion, sufficient odors still persist. Determinations by DEC Spill Investigators do not relinquish a responsible party's responsibilities or liabilities under the law.

2) Contaminant Concentrations

The soil shall not contain any contaminant at a concentration above 10,000 ug/kg (10,000 ppb). This maximum individual contaminant concentration should support the above odor determination, since some petroleum constituents will not leach at high concentrations but may exhibit odors.

If the soil does not exhibit petroleum-type odors and does not contain any individual contaminant at greater than 10,000 ppb, then the soil is considered acceptable for nuisance characteristics.

SECTION IV

GUIDANCE VALUES

A. Gasoline-Contaminated Soils

Table 1 lists the primary gasoline components of concern. The table identifies the compound names, the preferred EPA laboratory methods for determining contaminant concentration, the detection limits for a liquid matrix (water), the detection limits for a solid matrix (soil), the TCLP Extraction Guidance Values (C_w), the TCLP Alternative Guidance Values (C_a), the Human Health Guidance Values (C_h), and the Sediment Guidance Values (C_s).

Although EPA Method 8021 is preferred, other laboratory methods may be used with prior approval from the DEC Regional Spill Investigator. Other proposed methods should be evaluated on their ability to quantify the compounds of concern at acceptable detection levels.

The tabulated detection limits are the practical quantitation limits (PQLs). The PQL is the lowest level that can be measured within specified limits of precision during routine laboratory operations on most matrices. Efforts should be made to obtain the best detection possible when selecting a laboratory.

To demonstrate groundwater quality protection via the TCLP Extraction Method, the concentration of the hydrocarbon compound in the TCLP extract, as determined by EPA Method 8021 for a liquid matrix, must be less than or equal to the TCLP Extraction Guidance Value, C_w .

-OR-

To demonstrate groundwater quality protection via the TCLP Alternative Method, the concentration of the hydrocarbon compound in the soil, as determined by EPA Method 8021 for a solid matrix, must be less than or equal to the TCLP Alternative Guidance Value, C_a .

To demonstrate human health protection, the concentration of the hydrocarbon compound in the soil, as determined by EPA Method 8021 for a solid matrix, must be less than or equal to the Human Health Guidance Value, C_h .

To demonstrate fish and wildlife protection, the concentration of the hydrocarbon compound in the soil, as determined by EPA Method 8021 for a solid matrix, must be less than or equal to the Sediment Guidance Value C_s . Meeting this requirement is only necessary when dealing with contaminated sediment.

To demonstrate nuisance protection, the soil must not exhibit petroleum-type odors, and must not contain any contaminant at greater than 10,000 ppb, as determined by EPA Method 8021 for a solid matrix.

When the Guidance Value or standard is below the detection limit, achieving the detection limit will be considered acceptable for meeting the Guidance Value or standard, as long as the reported laboratory detection limits are reasonably close to the listed PQLs.

B. Fuel Oil-Contaminated Soil

Table 2 lists the primary fuel oil components of concern. As with Table 1, Table 2 identifies compound names, preferred EPA laboratory methods, detection limits, and Guidance Values.

Although EPA Methods 8021 and 8270 are preferred for identifying compounds of concern for gasoline and fuel oil, other laboratory methods may be used with prior approval from the DEC Regional Spill Investigator. Other proposed methods should be evaluated on their ability to quantify the compounds of interest at acceptable detection levels.

Since there is no single laboratory method which will analyze for all of the volatile and semi-volatile compounds of concern, it is generally necessary to use more than one laboratory method for fuel oil analysis. Both volatile and semi-volatile compounds must be addressed initially, but a reduced list of analytes may be acceptable for subsequent sampling depending upon the initial results.

As with Table 1, the detection limits in Table 2 are PQLs. Efforts should be made to obtain the best detection possible when selecting a laboratory.

Experience has shown that soil containing some of the insoluble semi-volatile compounds at high concentrations can exhibit a distinct odor even though the substances will not leach from the soil. Therefore, the maximum individual contaminant concentration of 10,000 ppb is instituted to help address this problem. In addition, anytime a soil exhibits discernible petroleum odors, even if it has met the numerical criteria, it shall not be considered clean enough for some reuse options under 6NYCRR Part 360, as described later in this document.

Odor determination is subjective. Since there is no recognized odor measuring device, some discrepancies may arise between responsible parties and the DEC on this subject. In order to document odor determinations and to address the need for remediation due to odors, the following approaches may be considered: (1) direct the laboratory to identify and quantify all pollutants present in the soil and/or leachate samples instead of just the method's target compounds; and (2) establish site-specific conditions based on an evaluation of

the characteristics of the site. The determination and evaluation of odors remains a subject requiring further research and policy development.

Some of the semi-volatiles are carcinogens, and subsequently have groundwater quality Guidance Values of 0.002 ppb. The TCLP Extraction Guidance Values are 0.002 ppb, and the TCLP Alternative Guidance Values are 0.04 ppb. The solid matrix detection limit does not approach this low value. Therefore, when these compounds are determined to be present, the TCLP Extraction Method and the Alternative Guidance Values must be satisfied to demonstrate groundwater quality protection for these particular contaminants. The following compounds listed in Table 2 are affected by this limitation: benzo(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; chrysene; benzo(ghi)perylene; and indeno(1,2,3-cd)pyrene.

Particular attention should be paid to the Human Health Guidance Values for fuel oil-contaminated soil. While the majority of the semi-volatiles have health Guidance Values considerably higher than the contaminant concentration generally encountered at spill sites, there are seven compounds listed in Table 2 which have Human Health Guidance Values lower than the detection limits. When any of these compounds (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and dibenz(a,h)anthracene) are present, the Human Health Guidance Value most likely will be the limiting factor for achieving acceptable cleanup levels.

To demonstrate groundwater quality protection via the TCLP Extraction Method, the concentrations of the hydrocarbon compounds in the TCLP extract, as determined by EPA Methods 8021 and 8270 Base/Neutral for a liquid matrix, must be less than or equal to the TCLP Extraction Guidance Value, C_w ;

-or-

To demonstrate groundwater quality protection via the TCLP Alternative Method, the concentrations of the hydrocarbon compounds in the soil, as determined by EPA Methods 8021 and 8270 Base/Neutral for a solid matrix, must be less than or equal to the TCLP Alternative Guidance Value, C_a . As described above, the TCLP Alternative Method is not a sufficient demonstration of groundwater protection for some contaminants.

To demonstrate human health protection, the concentrations of the hydrocarbon compounds in the soil, as determined by EPA Methods 8021 and 8270 Base/Neutral for a solid matrix, must be less than or equal to the Human Health Guidance Value, C_h .

To demonstrate fish and wildlife protection, the concentrations of the hydrocarbon compounds in the soil, as determined by EPA Methods 8021 and 8270 Base/Neutral for a solid matrix, must be less than or equal to the Sediment Guidance Value, C_s . Meeting this requirement is only necessary when dealing

with contaminated sediment.

To demonstrate nuisance protection, the soil must not exhibit petroleum-type odors, and must not contain any contaminant at greater than 10,000 ppb, as determined by EPA Methods 8021 and 8270 Base/Neutral for a solid matrix.

When the Guidance Value or standard is below the detection limit, achieving the detection limit will be considered acceptable for meeting the Guidance Value or standard, as long as the reported laboratory detection limits are reasonably close to the listed PQLs.

SECTION V

LABORATORY ANALYSIS

There are a variety of laboratory methods, established by the USEPA and the NYS Department of Health (DOH), which can be used to analyze petroleum-contaminated soils. The selection of appropriate laboratory methods depends on the compounds of concern, the detection limits for each compound, the nature of the samples to be analyzed, the capabilities of the laboratory, and the regulatory limits or Guidance Values to be achieved. The methods recommended and most often used for petroleum-contaminated soils are EPA Standard Methods 8021, 8270 (Base/Neutrals) and the TCLP extraction process. In every case, the NYSDEC will evaluate laboratory results from NYSDOH-approved laboratories only.

Each laboratory method identifies compounds which can be quantified with an acceptable degree of precision and accuracy. Many laboratory methods have petroleum compounds as target compounds, along with non-petroleum compounds. Method 8270, for example, identifies acid extractable hydrocarbons and base/neutral extractable hydrocarbons. The semi-volatile constituents of petroleum products are a sub-set of the base/neutral extractable compounds under Method 8270. Therefore, when requesting this analysis, base/neutrals only should be specified.

Some laboratories may be able to quantify non-target compounds of concern with particular methods. For example, there is no laboratory method which lists MTBE (methyl t-butyl ether) as a target compound; however, laboratories can include MTBE in their analysis using Method 8021. Therefore, when requesting this analysis, Method 8021 plus MTBE should be specified.

Each laboratory method establishes minimum concentrations of the target compounds which can be detected under ideal conditions using that particular procedure. These Method Detection Limits (MDLs) are rarely achievable under actual conditions in an analytical laboratory. Laboratories report their actual detection limits as Practical Quantitation Limits (PQLs). The PQLs for analysis on a liquid matrix are generally four times the MDLs. With a solid matrix, the PQLs will be affected by the quantity of contamination present, categorized as low, medium or high concentrations. Lower PQLs are generally possible with low level soil contamination. Laboratories must identify their PQLs when reporting analytical results.

Laboratories and methods to be utilized should be selected according to the best detection possible for the compounds of interest, and the regulatory or guidance levels needed to be achieved. For example, Table 2 indicates that naphthalene is a target compound for Method 8021 and Method 8270. Both of these methods can provide detection levels in a liquid matrix below the TCLP Extraction Guidance Value of 10 ppb. Therefore, either method could be used for analysis of a liquid matrix of naphthalene. However, for a solid matrix, Method 8021 is capable of providing much better detection of naphthalene than Method 8270. If the soil concentrations for naphthalene will be compared to the TCLP Alternative Guidance Value of 200 ppb, then Method 8021 should be used instead of Method 8270. If the soil concentrations for naphthalene will be compared only with the nuisance protection level of 10,000 ppb, or the Human Health Guidance Value of 300,000 ppb, then both Method 8021 and Method 8270 are capable of providing satisfactory detection levels for naphthalene.

Initial laboratory analysis should address the full range of compounds which may be present, considering the petroleum products involved. In consideration of prior laboratory results, potential contaminants may be eliminated from subsequent sampling analysis lists. As the contaminants are identified or eliminated, it may be appropriate to change laboratory methods during a project, to avoid unnecessary laboratory expenses. In addition, it may be appropriate to discuss analytical work with the laboratory in terms of the actual compounds of interest rather than method numbers and their defined target compounds. The final laboratory results for a project, however, should address the same full range of compounds as the initial sampling results, to confirm that the interim results did not overlook the appearance of other compounds. For example, gasoline-contaminated soil which is undergoing on-site bioremediation should be analyzed initially using Method 8021 plus MTBE. If only benzene, toluene, ethyl benzene and xylenes are detected, then Method 8020 could be used for interim sampling events. Upon completion of the bioremediation project, the soil should be analyzed using Method 8021 plus MTBE, to demonstrate the satisfaction of the Guidance Values applicable to the selected reuse option.

A detailed description of analytical protocols and procedures is available in the DEC Sampling Guidelines and Protocols manual.

SECTION VI

SAMPLING

Samples should be collected in such a manner so as to best characterize the extent of contamination of the soil in question. There is no specific number or type of samples which will apply to all situations and best engineering judgement will have to be used. The type of sample, grab or composite, will vary depending upon the constituent being identified. While grab samples come from one location, composites come from several locations and are joined to form one sample. When volatiles are in question, care must be taken when collecting composite samples to minimize the loss of volatiles during handling. In order to minimize handling of volatiles, several grab samples are preferred, with confirmatory composite samples. When sampling for semi-volatiles, several composite samples are preferred, with confirmatory grab samples.

The treatment process (if any) will also have a bearing as to how well a soil may be characterized. Low temperature thermal treatment units (e.g. rotary kiln dryers) process soil resulting in a more homogeneous mixture than would be obtained from a stationary pile. The following guidance is offered to assist the Regional Spill Investigator in determining the number and types of samples which should be requested for various treatment scenarios. More comprehensive samples may be required depending on the reuse or disposal alternative to be used.

The responsible party and the Regional Spill Investigator should agree on a sampling plan and review procedure before the samples are collected. All sample results submitted for regulatory compliance must be analyzed by New York State Department of Health approved laboratories.

A detailed description of soil sampling protocols and procedures is available in the DEC Sampling Guidelines and Protocols manual.

A. Tank Pit

If there is a question as to the extent of residual contamination, or if comprehensive documentation is necessary, a tank pit may be sampled for laboratory analysis.

A total of five samples should be taken from the excavation. One composite sample from each of the side walls at a distance approximately one third up from the bottom of the pit. Several samples should also be collected to form one composite sample from the bottom of the pit. Any remaining samples should be grab samples from areas with greater potential for contamination such as stained soils, adjacent to a corrosion hole, opposite a manway, or opposite a tank opening. All samples shall be taken no less than six inches below the exposed surface being sampled. Samples for compositing should be taken from random locations on the floor and walls of the tank pit.

B. Soil Pile

The number of samples required for an excavated pile will be related to the quantity of soil stockpiled. The table below can be used as a guide in determining the appropriate number of samples. If, in the opinion of the Regional Spill Investigator, additional samples are warranted, they should be requested.

Recommended Number of Soil Pile Samples

CONTAMINANT	SEMI-VOLATILES		VOLATILES	
SAMPLE TYPE	Grab	Composite	Grab	Composite
SOIL QUANTITY (yd ³)				
0-50	1	1	1	1
50-100	1	2	2	1
100-200	1	3	3	1
200-300	1	4	4	1
300-400	2	4	4	2
400-500	2	5	5	2
500-800	2	6	6	2
800-1000	2	7	7	2
> 1000 - Proposed Sampling plan shall be submitted for approval on site specific basis				

Best engineering judgement is needed to determine the most appropriate sampling locations. The objective of the sampling is to characterize the extent of contamination of the pile. Consideration should be given to how the soil was stockpiled. Is the most contaminated soil toward the top? Are areas visibly contaminated? How high and how long is the pile? It may be preferable to divide the pile into manageable segments. Samples should be taken from within the pile. Surface soil should not be used as sampling material. Samples shall be collected in accordance with proper sample collection techniques. All samples must be collected in glass containers with air-tight sealable tops.

Using the above sampling table, considering the factors mentioned above, and applying best engineering judgement, an acceptable evaluation of the contaminant concentrations in the soil can be made.

C. Processed Soil

Processed soil is soil which undergoes physical handling during a treatment process. Examples of treatment processes are rotary kiln dryers (low temperature thermal treatment units) or soil washing units. Soil under these conditions are more homogeneously mixed; therefore, individual samples are more likely to characterize the entire lot. Since these processes are continuous

in nature, the samples should be collected over a period of time similar to that described below:

- 1) A sample may be collected every twenty minutes for a period of two hours. The samples are then mixed to form one composite sample. This frequency will continue until all soils are processed. The twenty minute composite interval is a guideline which can be adjusted based on the amount of soil processed and the processing period. Testing protocols are specifically defined in the treatment unit's operating permit.
- 2) At least one grab sample should be taken for every two sets of composites.
- 3) A minimum of two samples (1 grab, 1 composite) should be taken for any treated soil batch.

D. Aboveground (Ex-Situ) Treatment

Typical aboveground treatment technologies are bioremediation and soil vapor extraction. Soil remediated under these conditions will be mixed (tilled) and spread evenly over a wide area. The soil will be spread to a uniform thickness, usually no higher than two feet, although depths may be higher for soil vapor extraction treatment. The shallow depth makes sample collection an easy process. The number of required samples can be based on the quantity of soil being treated (see above table). Depth of the sample can be anywhere from six inches to the bottom of the treatment layer. Care must be taken not to penetrate the liner material. The sampling locations and depths must be randomized.

E. Non-Excavated (In-Situ) Treatment

Treatment of non-excavated soil is similar to aboveground treatment in that the contamination is spread over a wide area. It differs, however, in that the depths of the contaminated zone are varied and usually extend much deeper. Once the volume of contaminated material is determined, the above table can be used to determine the number of required samples. The sampling locations and depths must be randomized.

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SECTION VII

MANAGEMENT OF EXCAVATED (EX-SITU) CONTAMINATED SOILS

Once non-hazardous petroleum-contaminated soil is moved from its original state, it is by definition a solid industrial waste and must be managed in accordance with Part 360 and transported in accordance with Part 364 regulations. There are several alternatives available to properly handle this contaminated soil.

A. Soils Which Do Not Meet Guidance Values

Soils which do not meet the guidance values can be processed under a specific DEC Beneficial Use Determination (BUD), such as at an approved hot-mix asphalt batching plant or at a cold-mix asphalt plant, disposed of at a DEC authorized landfill, or treated on site.

1) Reuse Under Specific Beneficial Use Determinations

The DEC Division of Solid Waste has made Beneficial Use Determinations (BUD's) under 6 NYCRR Part 360, identifying recycling or re-use activities which are not subject to Part 360 regulations. The use of petroleum-contaminated soil in a manufacturing process to produce a marketable product may be eligible for BUD issuance. Each manufacturing process operator must maintain compliance with the specific requirements of the issued BUD. Hot-mix and cold-mix asphalt manufacturing are two examples of processes which have received BUD's, and other processes may be approved by the Division of Solid Waste in the future.

a. Reuse at an Approved Asphalt Batching Plant

Several asphalt plants have been authorized to accept non-hazardous contaminated soil, for use as aggregate, provided the plant is in compliance with any other DEC regulations which may apply to the facility. For example, the use of petroleum-contaminated soil may require a modification of the facility's air emission permit.

b. Production of Cold-Mix Asphalt

A Beneficial Use Determination (BUD) has been issued to the process which combines liquid asphalt emulsion with the contaminated soil to produce a cold-mix asphalt. Approval to process petroleum-contaminated soil to produce a cold-mix asphalt is issued by the Spill Response Program. The applicant must satisfy specific testing requirements prior to receiving approval to process. Each BUD identifies allowable uses for the

manufactured cold-mix asphalt and any qualifying conditions and post-treatment testing protocols.

These asphalt products, if being stockpiled or transported for disposal rather than reuse, no longer meet the requirements for these BUDs and are subject to all applicable regulatory provisions of 6NYCRR Parts 360 and 364.

PCS containing asphalt products, which are left in a stockpile and are not being beneficially used, remain a solid waste until such use is accomplished. These materials shall be removed from the stockpile for beneficial use in accordance with their beneficial use approval requirements, or disposal if necessary, as rapidly as possible.

2) Disposal at an Authorized Landfill

A DEC-authorized landfill is one which either has an operating permit or is under a consent order. While this is not the preferred method of dealing with contaminated soil, it may be the most economical or, due to site constraints, the only alternative. Additional restrictions may be required by the landfill operators prior to accepting materials at their facilities.

3) Treatment On Site

Non-hazardous petroleum-contaminated soil may be treated on the site of generation without a DEC Part 360 Permit. Depending on the treatment technologies being utilized, other DEC permits may be required for air emissions and water discharges. The soil treatment processes may involve excavation of soils, securely stockpiling the soils until treatment is initiated, aboveground treatment of the soils, and/or placement of soils back into an excavation for treatment. The Regional Spill Investigator should require a remedial plan, signed by the responsible party, prior to the placement of contaminated soils into an excavation for treatment.

If the soil is to be placed back in an excavation for treatment, and if the excavation is determined to be uncontaminated, the excavation must be prepared and lined in such a manner to protect it against contamination from the soil which will be treated. However, if the excavation is contaminated it shall be the decision of the Regional Spill Investigator as to whether a liner is necessary.

All excavated soil shall be placed on an impervious material (eg: polyethylene sheeting) with the sides banked so as to control and contain run-off. During periods when no treatment is on-going, the surface of the pile(s) must also be covered with an impervious material.

The site may have to be evaluated for its impact to the ambient

air. Cross media contamination shall be minimized and aesthetic or nuisance issues shall be addressed. If space on the site is limited, or if the protection of the public health is in jeopardy, then on-site treatment will not be allowed and soil must be removed to a permitted location for treatment or disposal.

There are several methods of on-site soil treatment. Typical among these are soil venting, bioremediation, soil washing and low temperature thermal treatment. All treatment should be evaluated based on its ability to achieve the desired result in the most economical and efficient manner.

B. Soils Which Meet Guidance Values

The reuse options available for de-contaminated soil depends upon which particular Guidance Values are satisfied by the soil. Table 3 identifies the reuse options and the Guidance Values which must be met to use each reuse option.

As described earlier, the DEC Division of Solid Waste (DSW) has issued a Generic Beneficial Use Determination (BUD) which exempts petroleum-contaminated soils, which have been successfully incorporated into an asphalt product by a Bureau of Spill Prevention and Response (BSPR) approved producer and which will be utilized in a bonified paving project.

In addition, the DSW has determined that soils which satisfy the appropriate Guidance Values and which will be reused as highway sub-base material, fill for the original excavation, fill elsewhere on the site of generation, or fill off-site at pre-approved locations, are being beneficially used and are exempt from the provisions of 6NYCRR Part 360. These soils are also exempt from 6NYCRR Part 364 since they no longer meet the Part 364 definition of "solid waste".

The reuse options are not listed as a hierarchy; however, off-site reuse is generally less desirable. The Regional Spill Supervisor or his/her designee will review all appropriate soil sampling data to determine if the criteria has been met for the requested reuse option. Upon request from the responsible party, the evaluation of the submitted data shall be documented with a statement from the Regional Spill Supervisor that the soil does or does not meet the criteria for the desired reuse option. The DEC and its designee assume no liability when evaluating data for a responsible party with regard to the reuse or disposal of the soil in question. The generator of the soil has the ultimate responsibility for the accurate and precise characterization, and the safe and proper reuse or disposal of the material. In addition, soil which is being reused off site shall not be allowed to be transported prior to the receipt of the laboratory reports confirming that the soil has satisfied the appropriate Guidance Values of this guidance document. The responsible party shall maintain all field data, laboratory results, and final disposition records for three years.

The possible reuse options are presented below. Additional uses of decontaminated petroleum-contaminated soil may be identified in a Part 360 Permit or BUD for a specific facility.

1) Reuse as a Construction Material

Soil which satisfies the Guidance Values for groundwater protection, human health protection and nuisance characteristics can be reused as construction material. Construction material can include hot asphalt, cold-mix asphalt, concrete, roadway sub-base, etc. Final destination of the soil shall be identified prior to removal from the site.

2) Returned to the Original Excavation

Soil which satisfies the Guidance Values for groundwater protection, human health protection, and nuisance characteristics, can be placed back in the hole from which it was excavated.

3) Placed Elsewhere on Site

Soil which satisfies the Guidance Values for groundwater protection, human health protection, and nuisance characteristics, can be placed anywhere within the confines of the contiguously-owned property from which it originated.

4) Reuse Off-Site at a Pre-Approved Location

The Regional Spill Engineer and Regional Solid Waste Engineer may approve a request for an off-site reuse location for remediated soil which satisfies the Guidance Values for groundwater protection, human health protection, and nuisance characteristics. Sites which may be considered for this option are industrial sites, authorized construction and demolition debris landfills, petroleum storage facilities, authorized landfills, or other locations where public access is limited. Written approval must be received from the property owner(s) prior to exercising this reuse option. The responsible party may submit such a request to the Regional Spill Engineer who will coordinate with the Regional Solid Waste Engineer to approve or disapprove the request.

C. Rock Debris

Rock debris, for purposes of this policy, is defined as those rocks which are four (4) inches or greater in diameter. They shall be cleaned of any packed-on petroleum-contaminated soil. These rocks are not treated as a solid waste and can be disposed of as construction and demolition debris.

If rock debris cannot be separated from the petroleum-contaminated soil, it shall be handled as a solid waste in accordance with NYCRR Part 360 and/or Part 364 requirements.

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SECTION VIII

MANAGEMENT OF NON-EXCAVATED (IN-SITU) CONTAMINATED SOIL

In-situ contaminated soil may pose a threat to the groundwater, human health and the environment. These sites must be evaluated to determine the extent of contamination and the appropriate investigative or remedial actions necessary. The soil may be treated in-situ and evaluated by the same guidelines as excavated soil, while taking into account site-specific considerations and conditions.

Additional guidance will be developed to establish procedures for evaluating the potential impacts of non-excavated (in-situ) contaminated soils. Issues which should be considered when evaluating in-situ contaminated soil are environmental sensitivity of the site, level of residual contamination, soil characteristics, depth to groundwater, present and potential land use. A proper sampling plan will be necessary to determine the number, quantity and depth of samples to properly characterize the site.

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SECTION IX

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NYS Department of Environmental Conservation, Cleanup Standards Task Force, DRAFT Cleanup Policy and Guidelines, October 1991.

NYS Department of Environmental Conservation, Division of Hazardous Substances Regulation, 6NYCRR Part 364, Waste Transporter Permits, January 12, 1990.

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US Environmental Protection Agency, 40 CFR Part 261 Identification and Listing of Hazardous Wastes, June 29, 1990.

US Environmental Protection Agency, Health Effects Assessment Summary Table, April 4, 1991.

APPENDIX A

**HAZARDOUS WASTE DETERMINATION
AND REGULATORY LEVELS**

In accordance with DEC and EPA regulations, the generator of a waste material must determine if the material is a hazardous waste or a non-hazardous waste. The generator can make this determination using knowledge of the waste and/or laboratory analyses.

A waste material can be a hazardous waste due to its origin, its listed waste content, or its characteristics.

Soil contaminated with virgin petroleum products is a hazardous waste if it exhibits a characteristic of a hazardous waste, namely, ignitability, corrosivity, reactivity, and toxicity. The hazardous waste characteristics, defined in 6NYCRR Part 371, Section 371.3, and 40 CFR Section 261, are described below.

A. Ignitability:

A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

- 1) Is not a liquid and is capable under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.
- 2) It is a liquid, other than an aqueous solution containing less than 24 percent ethyl alcohol by volume, and has a flash point less than 60°C (140°F).
- 3) It is an ignitable compressed gas.
- 4) It is an oxidizer.

In accordance with guidance from the DEC Division of Hazardous Substances Regulation and based on knowledge of the waste, soils contaminated with virgin petroleum products do not exhibit the above properties and do not have to be tested for the ignitability characteristic.

B. Corrosivity:

A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

- 1) It is aqueous and has pH less than or equal to 2 or greater than or equal to 12.5.
- 2) It is a liquid and corrodes steel at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F).

Based on knowledge of the waste, soils contaminated with virgin petroleum products do not exhibit the above properties, and do not have to be tested for the corrosivity characteristic.

C. Reactivity:

A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

- 1) It is normally unstable and readily undergoes violent change without detonating.
- 2) It reacts violently with water.
- 3) It forms potentially explosive mixtures with water.
- 4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
- 5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in quantity sufficient to present a danger to human health or the environment.
- 6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
- 7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
- 8) It is a forbidden explosive, a Class A explosive or a Class B explosive.

Based on knowledge of the waste, soils contaminated with virgin petroleum products do not exhibit the above properties, and do not have to be tested for the reactivity characteristic.

D. Toxicity:

If the Toxicity Characteristic Leaching Procedure (TCLP) extract from a representative sample of the waste contain any of the contaminants identified in the attached listing of Hazardous Waste Regulatory levels at concentrations equal to or greater than the values listed, it is a hazardous waste.

With respect to petroleum-contaminated soil, the primary compound of concern is benzene. If the benzene concentration in a TCLP extract is equal to or greater than 500 ppb, the contaminated material is a characteristic hazardous waste. For

gasoline contaminated soil, toxicity for lead must also be evaluated.

The regulatory level of benzene in the soil is determined by analyzing the soil using the TCLP extraction method and determining the concentration in the extract.

A second method of determination is to identify the total concentration of the contaminant in the soil. If the total concentration is less than the regulatory level, then the leachate level could not possibly exceed the standard. This approach would save laboratory costs because the TCLP would not have to be run. If the total concentration in the soil exceeds the regulatory level required in the extract, no conclusion can be drawn from these results and a complete TCLP must be run.

Additional Information on Toxicity Characteristics

On March 29, 1990, the U.S. Environmental Protection Agency established the Toxicity Characteristic (TC) Rule. The TC Rule expands the list of contaminants by which a waste can be classified as hazardous due to toxicity, and it replaces the Extraction Procedure Toxicity (EP Tox) with the Toxicity Characteristic Leaching Procedure (TCLP). The TC Rule's specified contaminant list includes the same 14 metals and pesticides as the original toxicity list, plus 25 additional organic chemicals. Each of the 39 listed contaminants has the potential for rendering a particular material a characteristic hazardous waste due to toxicity. Since benzene is one of the 25 organic compounds added to the toxicity list, and since benzene is commonly found in petroleum products, it is possible that petroleum-contaminated soil may classify as a hazardous waste. Limited relief from these hazardous waste regulations is currently available because the TC Rule has specifically deferred petroleum-contaminated soil, groundwater, and debris generated from underground storage tank (UST) releases, until the impact of the regulation is further evaluated.

UST sites are essentially those sites which have underground storage tanks containing transportation fuels, such as gasoline, jet fuel, aviation gas, and diesel fuel. (See 40 CFR Section 280.12 for a more complete definition). The TC Rule does not apply to petroleum-contaminated media produced by a leak from an UST, including associated underground piping. However, DEC regulations state that the materials contaminated by transportation fuels can be hazardous wastes if they exhibit other hazardous waste characteristics, such as toxicity due to lead.

The TC Rule, as published on March 29, 1990, became effective on September 25, 1990, for large-quantity generators, and March 29, 1991, for small quantity generators. Large quantity generators are defined as those parties who generate 2,200 pounds or more of hazardous waste in any month. Small quantity generators are those parties who generate between 220 and 2,200 pounds of hazardous waste in any month. Until the DEC adopts the TC Rule, waste generators must comply with both the EPA and DEC waste regulations. Refer to the specific regulations of interest for more information.

**HAZARDOUS WASTE REGULATORY LEVELS
FOR TOXICITY CHARACTERISTIC**

CONSTITUENT	REGULATORY LEVEL (mg/L)
Arsenic	5.0
Barium	100.0
Benzene	0.5*
Cadmium	1.0
Carbon tetrachloride	0.5*
Chlordane	0.03*
Chlorobenzene	100.0*
Chloroform	6.0*
Chromium	5.0
o-Cresol	200.0*
m-Cresol	200.0*
Cresol (TOTAL)	200.0*
2,4-D	10.0
1,4-Dichlorobenzene	7.5*
1,2-Dichloroethane	0.5*
1,1-Dichloroethylene	0.7*
2,4-Dinitrotoluene	0.13*
Endrin	0.02
Heptachlor (and its epoxide)	0.008*
Hexachlorobenzene	0.13*
Hexachloro-1,3butadiene	0.5*
Hexachloroethane	3.0*
Lead	5.0
Lindane	0.4
Mercury	0.2

**HAZARDOUS WASTE REGULATORY LEVELS
FOR TOXICITY CHARACTERISTIC (Cont'd)**

CONSTITUENT	REGULATORY LEVEL (mg/L)
Methoxychlor	10.0
Methyl ethyl ketone	200.0*
Nitrobenzene	2.0*
Pentachlorophenol	100.0*
Pyridine	5.0*
Selenium	1.0
Silver	5.0
Tetrachloroethylene	0.7*
Toxaphene	0.5
Trichloroethylene	0.5*
2,4,5-Trichlorophenol	400.0*
2,4,6-Trichlorophenol	2.0*
2,4,5-TP (Silvex)	1.0
Vinyl chloride	0.2*

* New Toxicity Characteristics Effective 9/25/90

APPENDIX B

GUIDANCE VALUES AND REUSE OPTIONS

TABLE 1
Guidance Values For Gasoline Contaminated Soil*

Compound	EPA Method	Detection Limit ⁽¹⁾ (ppb)		TCLP Extraction Guidance Value ⁽²⁾ C _w (ppb)	TCLP Alternative Guidance Value C _s (ppb)	Human Health Guidance Value C _h (ppb)	Sediment Guidance Value C _s (ppb)
		Liquid	Solid				
Benzene	8021 (8020)	1	2	0.7	14	2.4 x 10 ⁴	
Ethylbenzene	8021 (8020)	1	2	5	100	8.0 x 10 ⁶	
Toluene	8021 (8020)	1	2	5	100	2.0 x 10 ⁷	
o-Xylene	8021 (8020)	2	2	5	100	2.0 x 10 ⁸	
m-Xylene	8021 (8020)	2	2	5	100	2.0 x 10 ⁸	
p-Xylene	8021 (8020)	2	2	5	100	***	
Mixed Xylenes	8021 (8020)	2	2	5	100	2.0 x 10 ⁸	
Isopropylbenzene	8021	1	1	5	100	***	
n-Propylbenzene	8021	1	1	5	100	***	
p-Isopropyltoluene	8021	1	1	5	100	***	
1,2,4-Trimethylbenzene	8021	1	1	5	100	***	
1,3,5-Trimethylbenzene	8021	1	1	5	100	***	
n-Butylbenzene	8021	1	1	5	100	***	
sec-Butylbenzene	8021	1	1	5	100	***	
Naphthalene	8021	1	1	10	200	3.0 x 10 ⁵	
Methyl t-butyl ether (MTBE) ⁽³⁾	8021 (8020)	1	1	50	1,000	***	

***Nuisance Characteristics Guidance:**

No petroleum-type odors.

No individual contaminant in soil at greater than 10,000 ppb.

⁽¹⁾ The listed Detection Limits are Practical Quantitation Limits (PQLs). The Method Detection Limit (MDL) is the best possible detection. Laboratories report the Practical Quantitation Limit (PQL), which is generally 4 times the MDL. Efforts should be made to obtain the best detection possible when selecting a laboratory. When the Guidance Value or standard is below the detection limit, achieving the detection limit will be considered acceptable for meeting the Guidance Value or standard.

⁽²⁾ The TCLP Extraction Guidance Values are equal to the NYSDEC groundwater quality standards or Guidance Values, or the NYSDOH drinking water quality standards or Guidance Values, whichever is more stringent.

⁽³⁾ Methyl t-butyl ether (MTBE) is not a target compound of Methods 8021 and 8020, but MTBE may be determined using these methods with appropriate quality assurance and quality control measures.

*** No Guidance Value identified in EPA HEAST Report.

TABLE 2
Guidance Values for Fuel Oil Contaminated Soil*

Compound	EPA Method	Detection Limit ⁽¹⁾ (ppb)		TCLP Extraction Guidance Value ⁽²⁾ C _w (ppb)	TCLP Alternative Guidance Value C _a (ppb)	Human Health Guidance Value C _h (ppb)	Sediment Guidance Value C _s (ppb)	
		Liquid	Solid				Fresh	Marine
Benzene	8021 (8020)	1	2	0.7	14	2.4 x 10 ⁴		
Ethylbenzene	8021 (8020)	1	2	5	100	8.0 x 10 ⁶		
Toluene	8021 (8020)	1	2	5	100	2.0 x 10 ⁷		
o-Xylene	8021 (8020)	2	2	5	100	2.0 x 10 ⁸		
m-Xylene	8021 (8020)	2	2	5	100	2.0 x 10 ⁸		
p-Xylene	8021 (8020)	2	2	5	100	***		
Mixed Xylenes	8021 (8020)	2	2	5	100	2.0 x 10 ⁸		
Isopropylbenzene	8021	1	1	5	100	***		
n-Propylbenzene	8021	1	1	5	100	***		
p-Isopropyltoluene	8021	1	1	5	100	***		
1,2,4-Trimethylbenzene	8021	1	1	5	100	***		
1,3,5-Trimethylbenzene	8021	1	1	5	100	***		
n-Butylbenzene	8021	1	1	5	100	***		
sec-Butylbenzene	8021	1	1	5	100	***		
t-Butyl benzene	8021	1	1	5	100	***		
Naphthalene ⁽³⁾	8021 (8270)	1 (6)	1 (330)	10	200	3.0 x 10 ⁵		
Anthracene	8270	8	330	50	1,000	2.0 x 10 ⁷		
Fluorene	8270	8	330	50	1,000	3.0 x 10 ⁶		
Phenanthrene	8270	22	330	50	1,000	***		
Pyrene	8270	8	330	50	1,000	2.0 x 10 ⁶		
Acenaphthene	8270	8	330	20	400	5.0 x 10 ⁶		
Benzo(a)anthracene	8270	31	330	.002	.04 ⁽⁴⁾	220	33	18
Fluoranthene	8270	9	330	50	1,000	3.0 x 10 ⁶		

(CONTINUED ON THE NEXT PAGE)

TABLE 2 (Cont'd)
Guidance Values for Fuel Oil Contaminated Soil*

Compound	EPA Method	Detection Limit (ppb)		TCLP Extraction Guidance Value ⁽³⁾ C _w (ppb)	TCLP Alternative Guidance Value C _a (ppb)	Human Health Guidance Value C _h (ppb)	Sediment Guidance Value C _s (ppb)	
		Liquid	Solid				Fresh	Marine
Benzo(b)fluoranthene	8270	19	330	.002	.04 ⁽⁴⁾	220	33	18
Benzo(k)fluoranthene	8270	10	330	.002	.04 ⁽⁴⁾	220	33	18
Chrysene	8270	10	330	.002	.04 ⁽⁴⁾	***	33	18
Benzo(a)pyrene	8270	10	330	.002	.04 ⁽⁴⁾	61	33	18
Benzo(g,h,i)perylene	8270	10	330	.002	.04 ⁽⁴⁾	***		
Indeno(1,2,3-cd)pyrene	8270	10	330	.002	.04 ⁽⁴⁾	***		
Dibenz(a,h)anthracene	8270	10	330	50	1,000	14		

*** Nuisance Characteristics Guidance:**

No Petroleum-type odors.

No individual contaminant in soil at greater than 10,000 ppb.

⁽¹⁾ The listed Detection Limits are Practical Quantitation Limits (PQL's). The Method Detection Limit (MDL) is the best possible detection. Laboratories report the Practical Quantitation Limit (PQL), which is generally 4 times the MDL. Efforts should be made to obtain the best detection possible when selecting a laboratory. When the Guidance Value or standard is below the detection limit, achieving the detection limit will be considered acceptable for meeting the Guidance Value or standard.

⁽²⁾ The TCLP Extraction Guidance Values are equal to the NYSDEC groundwater quality standards or Guidance Values, or the NYSDOH drinking water quality standards or Guidance Values, whichever is more stringent.

⁽³⁾ For naphthalene analysis in a liquid matrix, both Method 8021 and Method 8270 can provide satisfactory levels for comparison to the C_w of 10 ppb.

For naphthalene analysis in a solid matrix, Method 8021 is preferred over Method 8270 for comparison to the C_s of 200 ppb. If the C_s Guidance Value is not being used in the soil evaluation, then both Method 8021 and 8270 can provide satisfactory detection levels for comparison to the C_h of 3.0 x 10⁵, and nuisance characteristic of 10,000 ppb.

⁽⁴⁾ Due to the high detection limit for a solid matrix, the TCLP Extraction Method must be used to demonstrate groundwater quality protection for these compounds.

*** No Guidance Value identified in EPA HEAST Report.

TABLE 3
Soil Reuse Options

Reuse Option	Minimum Criteria To Be Met ⁽¹⁾		
	Protection of Groundwater	Protection of Human Health	Protection Against Nuisance Characteristics
Asphalt ⁽²⁾ or Concrete Manufacturing			
Cold-Mix Asphalt ⁽²⁾			
Construction Material	X	X	X
Fill for Original Excavation	X	X	X
Fill Elsewhere On-Site	X	X	X
Off-Site at Pre-Approved Location	X	X	X

⁽¹⁾ In addition, the criteria for protection of fish and wildlife must be met when sediments are the waste materials being handled, and when these soils or sediments are being disposed in surface waters, marine waters, or wetland areas.

⁽²⁾ The soils must satisfy the criteria established under the particular BUD issuance.

AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

**New York State
Department of Environmental Conservation
Division of Water
Albany, New York**

October 1993

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE NO.</u>
● Introduction	1
I. Description of Columns in Table 1	1
II. Development, Interpretation and Use	5
III. Determination of Applicability of POC Standard to Specific Substances	7
● Table 1, Standards and Guidance Values	10
● Table 2, <u>Partial</u> List of Substances Regulated by the POC Groundwater Standard of 5 ug/L	50
● Table 3, <u>Partial</u> List of Substances <u>Not</u> Regulated by the POC Groundwater Standard	54
● Table 4, Explanation of Basis Codes in Tables 1 and 2	64
● Table 5, Definitions for Principal Organic Contaminant Classes	65
● Index to Table 1, Table 2 and Table 3 Entries By CAS No	66

INTRODUCTION

This document presents Division of Water ambient water quality standards and guidance values. The authority for these values is derived from Article 17 of the Environmental Conservation Law and 6 NYCRR Parts 700-705, Water Quality Regulations.

Standards and guidance values for toxic and non-conventional pollutants are presented in Table 1. This Table includes all of the division's numerical standards and guidance values established as of the date of this document except standards for dissolved oxygen, dissolved solids, coliforms, pH, color, odor and turbidity. The reader is referred to Part 703 for the excepted standards.

Section I of this Introduction provides a description of the columns in Table 1. Section II provides guidance on certain aspects of development, interpretation and use of standards and guidance values. Section III concerns the principal organic contaminant (POC) groundwater standard, which is a general standard. It provides detailed instructions on its applicability to specific substances.

I. DESCRIPTION OF COLUMNS IN TABLE 1

A. Standard and Guidance Value

Standards and guidance values are ambient water quality values that are set to protect the state's waters. They both are derived according to scientific procedures that are in regulation (6 NYCRR Part 702).

A standard is a value that has been promulgated and placed into regulation. The standards for the surface water and groundwater classes are extracted from Part 703 of Title 6. Surface water and groundwater standards were last revised effective September 1, 1991.

A guidance value may be used where a standard for a substance or group of substances has not been established for a particular water class and type of value (section 702.15).

In addition to specific guidance values, the regulations (702.15(a)(1)(ii)) allow the department to develop a health (water source) "general organic guidance value" of 50 ug/L for an individual organic substance. The department can derive this value where procedures in 702.3 - 702.7 do not yield a more stringent value and where adequate and sufficient oncogenic

and non-oncogenic data to justify a value greater than 50 ug/L are not available. The above determinations for specific substances are made by the Criteria and Standards Section.

As with other guidance values for specific substances, all guidance values derived from the general organic guidance value as of the date of this document are listed in Table 1 of this TOGS.

Standards and guidance values are the maximum allowable concentration in units of ug/L, unless otherwise indicated. Where standards or guidance values are expressed as a function of hardness, hardness is in units of parts per million (ppm), expressed as calcium carbonate, and the resulting value is in ug/L. Also, in such hardness functions, the term "exp" represents the base e exponential function. "ND" means a non-detectable concentration by the approved analytical methods referenced in section 700.3.

B. Substance (CAS No.)

The substance or group of substances (entry) for which a standard or guidance value has been derived is presented in this column in alphabetical order. The Chemical Abstract Service Registry (CAS) Number(s) are given, where applicable, to provide positive identification. Because a substance may be known by names other than the one used in this document, identification of the CAS number can be useful for locating the substance. An index of CAS numbers is provided.

Some of the groups contain a large or unlimited number of substances that are not identified specifically; therefore, a determination of the specific substances encompassed by a standard or guidance value may be necessary. Group entries fit into one of three categories, as described below. For each such entry, a Remark will indicate whether the standard(s) or guidance value(s) apply to the sum of the substances or to each substance individually.

Interpretation of Group Entries

1. Where the entry consists of two or more specific substances, with or without CAS Numbers (e.g.: Aldrin and Dieldrin), the entry includes only the specific substances listed.
2. Where the entry is the name of a group of substances, with CAS numbers listed (e.g.: Dichlorotoluenes), the entry includes only those substances for which the CAS Numbers are listed.

3. Where the entry is the name of a group of substances, without CAS Numbers (e.g.: Principal organic contaminant), the entry includes all substances that belong to the group, unless otherwise noted. These specific substances may not be listed in the entry or the index. A determination of the specific substances encompassed by the standard(s) or guidance value(s), therefore, may be necessary.

The principal organic contaminant (POC) standard for groundwater is the largest and most complex of this third type of group entry. It is a general standard that applies individually to a virtually unlimited number of substances in six chemical classes. Because of the importance of this general groundwater standard, instructions for determining its applicability to specific substances are included in Section III, below.

The other group entries in Table 1 without CAS Nos. are identified below for convenience:

Alkyl diphenyl oxide sulfonates
Aminomethylene phosphonic acid salts
Aryltriazoles
Boric acid, Borates and Metaborates
Chlorinated dibenzo-p-dioxins and Chlorinated dibenzofurans
Foaming agents
Isothiazolones, total
Linear alkyl benzene sulfonates (LAS)
Methylbenz(a)anthracenes
Phenolic compounds (total phenols)
Phenols, total chlorinated
Phenols, total unchlorinated
Polychlorinated biphenyls
Quaternary ammonium compounds
Sulfides, total

C. Water Classes and Type

Standards and guidance values are developed for specific classes of fresh and saline surface waters and fresh groundwaters for protection of the best usages assigned to each class. Best usages are described in Part 701. Standards and guidance values are further designated as to "Type." Values for protection of sources of drinking water are designated Health (Water Source) and noted by H(WS). Similarly, values for protection of human consumers of fish are designated as Health (Bioaccumulation) and noted by H(B). Values for protection of aquatic life and for wildlife consumers of

fish are designated as Aquatic and noted by A. Designation of the Type of value determines the applicability of section 702.17, which concerns variances for aquatic type values, and section 702.15, which concerns derivation of guidance values.

A summary description of best usage protections, water classes and type of values related to toxic pollutants is presented below. The groupings of Water Classes and Type presented for the summary description are those that frequently appear in Table 1. A complete description of the water classifications is provided in Part 701.

<u>Water Classes</u>	<u>Type</u>	<u>Protection For</u>
A, A-S, AA, AA-S	H(WS)	Source of Drinking Water
GA	H(WS)	Source of Drinking Water
A, A-S, AA, AA-S, B, C	A	Fish Propagation or Wildlife Consumption of Fish
D	A	Fish Survival or Wildlife Consumption of Fish
A, A-S, AA, AA-S, B, C, D	H(B)	Human Consumption of Fish
SA, SB, SC, I	A	Fish Propagation or Wildlife Consumption of Fish
SD	A	Fish Survival or Wildlife Consumption of Fish
SA, SB, SC, I, SD	H(B)	Human Consumption of Fish

For many substances, more than one Type of value will be listed for a specific water class. In these situations, all values apply and may be used to derive the most stringent limitations.

D. Basis Code

The letters in this column designate the specific procedure used to derive the standard or guidance value. The key to the letter designations is provided in Table 4.

II. DEVELOPMENT, INTERPRETATION AND USE

A. Development of Standards and Guidance Values

Guidance values are developed as needed with priorities primarily reflecting greater expected or observed occurrence in the environment and greater toxicity. Most requests for development of guidance values originate through the use and discharge information that is generated through the State Pollutant Discharge Elimination System (SPDES) permit program. Standards are proposed for rule making with similar priority considerations.

As stated previously, a guidance value may be utilized where a standard has not been adopted for a substance. Guidance values that have been developed for surface waters and groundwaters are presented in Table 1. If a substance is judged to pose a threat to the environment and if no standard or guidance value is presented in Table 1 for that substance and water class, a request for development of a guidance value should be made to the Criteria and Standards Section.

B. Analytical Methods

Section 700.3 provides the analytical requirements to determine compliance with water quality standards and guidance values. These regulations include specific analytical references and also refer to "...other methods approved by the department..." The Division of Water maintains a compilation of methods approved by the department in a separate Technical and Operational Guidance Series (TOGS) document.

There are a number of water quality standards and guidance values for which there is no approved analytical procedure. Use of these values should be accompanied by the identification of an acceptable analytical method.

C. SPDES Effluent Limits

Ambient water quality standards and guidance values are used to derive water quality-based effluent limitations for SPDES permits. Instruction for the derivation of these limitations is provided in a separate TOGS document. There are, however, a number of topics that warrant discussion here.

1. Hydrologic Flow Base and Averaging Period

The derivation of water quality based effluent limitations from ambient water quality standards or guidance values requires selection of a receiving water flow and the specification of an averaging period for the effluent limitation. Their selection will be a function of the variability of the receiving water flow and effluent load and the time period associated with the critical health or aquatic effect. In general, health or aquatic standards and guidance values that are based on adverse effects that develop over time periods greater than a month will receive effluent limitations based on the minimum average 30 consecutive day receiving water flow with a one-in-ten year occurrence (MA30CD/10) and calculated as a monthly average. Values based on shorter-term adverse effects will generally receive effluent limitations based on MA7CD/10 flow and calculated as a daily maximum. Specific determinations, however, are made at the time of permit issuance.

2. Chemical Species

Certain ambient standards and guidance values apply to a specific toxic species rather than all forms (total) of the substance. Changes in the form of a substance can occur in the receiving water. As a result, the form of the substance that is specified as an effluent limitation may differ from the form of the ambient standard or guidance value.

3. Groundwater Effluent Limitations

Section 702.16 provides authority for groundwater effluent limitations. Section 703.6 of the water quality regulations provides specific effluent standards for discharges to class GA waters. For substances for which there is no groundwater effluent standard in 703.6, groundwater effluent limitations shall apply as follows:

- ⊗ for substances with an ambient guidance value for groundwater, the groundwater effluent limitation shall be equal to the ambient guidance value;
- ⊗ for substances to which the groundwater POC standard applies, the groundwater effluent limitation shall be 5 ug/L;

- for organic substances that have an ambient groundwater standard of 50 ug/L, the groundwater effluent limitation shall be 50 ug/L; and
- for substances that have an ambient groundwater standard other than 50 ug/L, the groundwater effluent limitation shall be determined using site specific considerations.

4. Total of Organic Chemicals [§]

Subparagraph 702.16(b)(3) of the water quality regulations specifies, for the purpose of deriving effluent limitations for surface water, an ambient value of 100 ug/L for the total of organic substances having a standard or guidance value established pursuant to the human-health methodologies. The only substances included in this total are those listed in Table 1 of this TOGS that have both the symbol "s" above the name and a health (water source) [H(Ws)] type standard or guidance value for surface water.

A groundwater effluent limitation shall be established at 100 ug/L for the total of certain organic substances. The substances included in this total are those listed in Table 1 of this TOGS that have both the symbol "s" above the name and a standard or guidance value for groundwater. This includes all substances covered by the principal organic contaminant groundwater standard (Table 1, page 41), whether they are listed in this TOGS or not (see I.C. above and III below).

III. DETERMINATION OF APPLICABILITY OF POC STANDARD TO SPECIFIC SUBSTANCES

A. Introduction

The POC standard for groundwater (Table 1, page 41) is a general standard that applies individually to an unlimited number of substances in six chemical classes. Consequently, its applicability to specific substances must be determined.

The POC standard was developed by the New York State Department of Health (DOH) for drinking water. The definitions of the six POC classes (6 NYCRR section 700.1 and Table 5 of this TOGS), obtained from the DOH regulations, are definitive for the first two classes, but require interpretation for the others. Furthermore, some substances that meet the definition of a particular POC class may not be regulated by the POC standard because

they have a more stringent specific standard. It is, therefore, important to follow sequentially the steps below for determining the applicability of the POC groundwater standard.

It should be noted that the POC applies as a general standard only to groundwater.

B. Steps for Determining Applicability of the POC Groundwater Standard (not to be used for surface water)

This procedure consists of five steps. These steps must be followed in sequential order to avoid making an incorrect determination. They include reference to three tables within this TOGS, the use of definitions for two POC classes, and how to obtain assistance.

Step 1: Check Table 1 of this TOGS. If the substance is listed in Table 1 as having either a specific groundwater standard or groundwater guidance value, that listed value applies and the reader should not go further. If not, go on to Step 2.

Step 2: Check Table 2 of this TOGS, which is a partial list of substances regulated by the POC groundwater standard. If the substance is listed in Table 2, the POC groundwater standard of 5 ug/L applies and the reader should not go further. If the substance is not in Table 2, go on to Step 3.

Step 3: Check Table 3 of this TOGS, which is a partial list of substances to which the POC groundwater standard does not apply. If the substance is listed in Table 3, the standard does not apply and the reader should not go further. If the substance is not in Table 3, go on to Step 4.

[Note: The number of substances in both Tables 2 and 3 will increase as determinations of POC applicability are made to additional substances, but the lists can never be complete.]

Step 4: Compare the substance with the definitions of POC classes 1 and 2, below. If it meets either of these definitions, the POC groundwater standard applies and the reader should not go further. If it does not meet either definition, or if the reader is uncertain whether it does, go on to Step 5.

Definitions of POC Classes 1 and 2:

Class 1 - Halogenated alkane*: Compound containing carbon (C), hydrogen (H) and halogen (X) where X = fluorine (F), chlorine (Cl), bromide (Br) and/or iodine (I), having the general formula $C_nH_yX_z$, where $y + z = 2n + 2$; n, y and z are integer variables; n and z are equal to or greater than one and y is equal to or greater than zero.

Class 2 - Halogenated ether: Compound containing carbon (C), hydrogen (H), oxygen (O) and halogen (X) (where X = F, Cl, Br and/or I) having the general formula $C_nH_yX_zO$, where $y + z = 2n + 2$; the oxygen is bonded to two carbons; n, y and z are integer variables; n is equal to or greater than two, y is equal to or greater than zero and z is equal to or greater than one.

Step 5: Although the definitions of the remaining classes are in regulation and reproduced in Table 5, determinations beyond this point involve interpretations, including chemical comparisons with previously determined substances. The user, therefore, should contact the Criteria and Standards Section (CSS) staff (Scott Stoner or Arline Sumner, 518-457-3651) for assistance. The CSS will make the determination, consulting with the DOH as needed. Provision of the CAS number and structure of the substance will facilitate the determination.

*Note: This definition does not mention the specific exclusions listed in the definition in regulation (6 NYCRR 700.1 and Table 5) because those excluded substances are listed in Table 1 of this TOGS and thus covered by Step 1 of this procedure.

TABLE 1

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Acetone (67-64-1)	A, A-S, AA, AA-S GA		50 50	H(W) H(W)	Z Z
\$ Acenaphthene (83-32-9)	A, A-S, AA, AA-S GA	20	20	H(W) H(W)	D D
\$ Acrylic acid (79-10-7)	A, A-S, AA, AA-S GA		50 50	H(W) H(W)	Z Z
\$ Acrylonitrile (107-13-1)	A, A-S, AA, AA-S GA	5	0.07	H(W) H(W)	A J
\$ Alachlor (15972-60-8)	A, A-S, AA, AA-S GA	35	0.3	H(W) H(W)	A F
\$ Aldicarb (116-06-3)	A, A-S, AA, AA-S	7		H(W)	B
\$ Aldicarb & Methomyl (116-06-3; 16752-77-5)	GA	0.35		H(W)	F

Remarks: Value listed applies to sum of these substances.

\$ Aldicarb sulfone (1646-88-4)	A, A-S, AA, AA-S GA		2* 2*	H(W) H(W)	G G
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Remarks: * This substance did not receive a review beyond determining the existence of a Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.

\$ Aldicarb sulfoxide (1646-87-3)	A, A-S, AA, AA-S GA		4* 4*	H(W) H(W)	G G
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Remarks: * This substance did not receive a review beyond determining the existence of a Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Aldrin (309-00-2)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C, D SA, SB, SC, SD I	ND * *	0.002 *	H(W) H(W) H(B) H(B) H(B)	A F

Remarks: * Refer to entry for "Aldrin and Dieldrin."

§ Aldrin & Dieldrin (309-00-2; 60-57-1)	A, A-S, AA, AA-S, B, C, D SA, SB, SC, SD I	0.001 0.001	 0.001	H(B) H(B) H(B)	K K K
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Remarks: Values listed apply to sum of these substances.

§ Alkyl dimethyl benzyl ammonium chloride (68391-01-5)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C	 *	50 50	H(W) H(W) A	Z Z
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Remarks: * Refer to entry for "Quaternary ammonium compounds."

§ Alkyl diphenyl oxide sulfonates (Not Applicable)	A, A-S, AA, AA-S GA	 	50* 50*	H(W) H(W)	Z Z
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Remarks: * Applies to each alkyl diphenyl oxide sulfonate individually.

Aluminum, Ionic (Not Applicable)	A, A-S, AA, AA-S, B, C	100		A	N
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§ Ametryn (834-12-8)	A, A-S, AA, AA-S GA	 50	50	H(W) H(W)	Z J
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§ Aminocresols (95-84-1; 2835-95-2; 2835-99-6)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C D	* * ** **		H(W) H(W) A A	
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Remarks: * Refer to entry for "Phenolic compounds (total phenols)."

** Refer to entry for "Phenols, total unchlorinated."

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Aminomethylene phosphonic acid salts (Not Applicable)	A, A-S, AA, AA-S GA		50* 50*	H(W) H(W)	Z Z

Remarks: * Applies to each aminomethylene phosphonic acid salt individually.

\$ Aminopyridines (462-08-8; 504-24-5; 504-29-0; 26445-05-6)	A, A-S, AA, AA-S GA		1 1	H(W) H(W)	B B
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Remarks: Values listed apply to sum of these substances.

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
Ammonia and Ammonium (7664-41-7; Not Applicable)	A, A-S, AA, AA-S	2,000*		H(W.S)	H
	GA	2,000*		H(W.S)	H
	A, A-S, AA, AA-S, B, C	**		A	N
	D	**		A	Q

Remarks: * $\text{NH}_3 + \text{NH}_4^+$ as N.

** Un-ionized ammonia as NH_3 ; tables below provide the standard in ug/l at varying pH and temperature for different classes and specifications. Linear interpolation between the listed pH values and temperatures is applicable.

Classes A, A-S, AA, AA-S, B, C with the (T) or (TS) Specification

pH	0°C	5°C	10°C	15°C	20-30°C
6.50	0.7	0.9	1.3	1.9	
6.75	1.2	1.7	2.3	3.3	
7.00	2.1	2.9	4.2	5.9	
7.25	3.7	5.2	7.4	11	
7.50	6.6	9.3	13	19	
7.75	11	15	22	31	
8.0-9.0	13	18	25	35	

Classes A, A-S, AA, AA-S, B, C without the (T) or (TS) Specification

pH	0°C	5°C	10°C	15°C	20-30°C
6.50	0.7	0.9	1.3	1.9	2.6
6.75	1.2	1.7	2.3	3.3	4.7
7.00	2.1	2.9	4.2	5.9	8.3
7.25	3.7	5.2	7.4	11	15
7.50	6.6	9.3	13	19	26
7.75	11	15	22	31	43
8.0-9.0	13	18	25	35	50

Class D

pH	0°C	5°C	10°C	15°C	20°C	25-30°C
6.50	9.1	13	18	26	36	51
6.75	15	21	30	42	59	84
7.00	23	33	46	66	93	131
7.25	34	48	68	95	140	190
7.50	45	64	91	130	180	260
7.75	56	80	110	160	220	320
8.0-9.0	65	92	130	180	260	370

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

Total Ammonia (mg/L NH₃)

Classes A,A-S, AA, AA-S, B, C with the (T) or (TS) Specification

pH	0°C	5°C	10°C	15°C	20°C	25°C	30°C
6.50	2.5	2.4	2.2	2.2	1.5	1.0	.73
6.75	2.5	2.4	2.2	2.2	1.5	1.0	.73
7.00	2.5	2.4	2.2	2.2	1.5	1.0	.74
7.25	2.5	2.4	2.2	2.2	1.5	1.0	.74
7.50	2.5	2.4	2.2	2.2	1.5	1.1	.74
7.75	2.3	2.2	2.1	2.0	1.4	.99	.71
8.00	1.5	1.4	1.4	1.3	.93	.66	.47
8.25	.87	.82	.78	.76	.54	.39	.28
8.50	.49	.47	.45	.44	.32	.23	.17
8.75	.28	.27	.26	.27	.19	.15	.11
9.00	.16	.16	.16	.16	.13	.10	.08

Classes A, A-S, AA, AA-S, B, C without the (T) or (TS) Specification

pH	0°C	5°C	10°C	15°C	20°C	25°C	30°C
6.50	2.5	2.4	2.2	2.2	2.1	1.5	1.0
6.75	2.5	2.4	2.2	2.2	2.1	1.5	1.0
7.00	2.5	2.4	2.2	2.2	2.1	1.5	1.0
7.25	2.5	2.4	2.2	2.2	2.1	1.5	1.1
7.50	2.5	2.4	2.2	2.2	2.1	1.5	1.1
7.75	2.3	2.2	2.1	2.0	1.9	1.4	1.0
8.00	1.5	1.4	1.3	1.3	1.3	.93	.67
8.25	.87	.82	.78	.76	.76	.54	.40
8.50	.49	.47	.45	.44	.45	.33	.25
8.75	.28	.27	.26	.27	.27	.21	.16
9.00	.16	.16	.16	.16	.17	.14	.11

Class D

pH	0°C	5°C	10°C	15°C	20°C	25°C	30°C
6.50	35	33	31	30	29	29	20
6.75	32	30	28	27	27	26	19
7.00	28	26	25	24	23	23	16
7.25	23	22	20	20	19	19	14
7.50	17	16	16	15	15	15	10
7.75	12	11	11	11	10	10	7.3
8.00	8.0	7.5	7.1	6.9	6.8	6.8	4.9
8.25	4.5	4.2	4.1	4.0	3.9	4.0	2.9
8.50	2.6	2.4	2.3	2.3	2.3	2.4	1.8
8.75	1.4	1.4	1.3	1.4	1.4	1.5	1.1
9.00	.86	.83	.83	.86	.91	1.0	.82

This table provides total ammonia concentrations that will contain the un-ionized ammonia concentration at the level of the standard at the respective pH and temperatures based on relationships established in USEPA 1985, Ambient Water Quality Criteria for Ammonia - 1984. Office of Water, Criteria & Standards Division, Washington, D.C. 20460. EPA 440/5-85-001. January 1985. (Cited, Thurston, R.V., R.C. Russo, and K. Emerson. 1979. Aqueous ammonia equilibrium - tabulation of percent un-ionized ammonia. EPA Ecol. Res. Ser. EPA-600/3-79-091. Environmental Research Laboratory, U.S. Environmental Protection Agency, Duluth, MN: 427 p.)

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER			
		STANDARD	GUIDANCE VALUE	TYPE	BASIS CODE
\$ Aniline (62-53-3)	A, A-S, AA, AA-S GA	5	4	H(WS) H(WS)	A J
\$ Anthracene (120-12-7)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
Antimony (Not Applicable)	A, A-S, AA, AA-S GA		3 3	H(WS) H(WS)	B B
Arsenic (Not Applicable)	A, A-S, AA, AA-S	50		H(WS)	G
	GA	25		H(WS)	F
	A, A-S, AA, AA-S, B, C	190*		A	N
	D	360*		A	Q
	SA, SB, SC	63*		A	N
	I		36*	A	N
	SD	120*		A	Q
Remarks: * Dissolved arsenic form.					
Aryltriazoles (Not Applicable)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
Remarks: Applies to each aryltriazole individually.					
\$ Atrazine (1912-24-9)	A, A-S, AA, AA-S GA	7.5	3*	H(WS) H(WS)	G F
Remarks: * This substance did not receive a review beyond determining the existence of a Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ Azinphosmethyl (86-50-0)	A, A-S, AA, AA-S		0.07	H(WS)	A
	GA	4.4		H(WS)	F
	A, A-S, AA, AA-S, B, C	0.005		A	N
	SA, SB, SC	0.01		A	N
	I		0.01	A	N
\$ Azobenzene (103-33-3)	A, A-S, AA, AA-S GA	5	0.5	H(WS) H(WS)	A J
Barium (Not Applicable)	A, A-S, AA, AA-S	1,000		H(WS)	G
	GA	1,000		H(WS)	F

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Benefin (1861-40-1)	GA	35		H(WS)	F
\$ Benz(a)anthracene (56-55-3)	A, A-S, AA, AA-S GA		0.002 0.002	H(WS) H(WS)	A,E A,E
\$ Benzene (71-43-2)	A, A-S, AA, AA-S	0.7		H(WS)	A
	GA	0.7		H(WS)	A
	A, A-S, AA, AA-S, B, C, D		6	H(B)	K
	SA, SB, SC, I, SD		6	H(B)	K
\$ Benzidine (92-87-5)	A, A-S, AA, AA-S		0.02	H(WS)	A
	GA	5		H(WS)	J
	A, A-S, AA, AA-S, B, C	0.1		A	N
	D	0.1		A	Q
\$ Benzisothiazole (271-61-4)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Benzo(b)fluoranthene (205-99-2)	A, A-S, AA, AA-S		0.002	H(WS)	A,E
	GA		0.002	H(WS)	A,E
\$ Benzo(k)fluoranthene (207-08-9)	A, A-S, AA, AA-S		0.002	H(WS)	A,E
	GA		0.002	H(WS)	A,E
\$ Benzo(a)pyrene (50-32-8)	A, A-S, AA, AA-S		0.002	H(WS)	A
	GA	ND		H(WS)	F
	A, A-S, AA, AA-S, B, C, D		0.0012	H(B)	K
	SA, SB, SC, I, SD		0.0006	H(B)	K
Beryllium (Not Applicable)	A, A-S, AA, AA-S		3	H(WS)	B
	GA		3	H(WS)	B
	A, A-S, AA, AA-S, B, C	*		A	N
Remarks: * 11 ug/L, when hardness is less than or equal to 75 ppm; 1,100 ug/L, when hardness is greater than 75 ppm. Aquatic standards apply to acid-soluble form.					
\$ Bis(2-chloroethyl) ether (111-44-4)	A, A-S, AA, AA-S GA	1.0	0.03	H(WS) H(WS)	A F

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Bis(2-ethylhexyl) phthalate (117-81-7)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C	50 0.6	4	H(WS) H(WS) A	A J N
Boric acid, Borates & Metaborates (Not Applicable)	A, A-S, AA, AA-S GA		125 125	H(WS) H(WS)	B B
Remarks: Applies as boron equivalents. Values listed apply to sum of these substances.					
Boron (Not Applicable)	GA A, A-S, AA, AA-S, B, C SA, SB, SC I	1,000 10,000 1,000		H(WS) A A A	H N N N
Remarks: Aquatic standards and guidance value apply to acid-soluble form.					
§ Bromacil (44-40-9)	GA	4.4		H(WS)	F
Bromide (Not Applicable)	A, A-S, AA, AA-S GA		2,000 2,000	H(WS) H(WS)	B B
§ Bromobenzene (108-86-1)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ Bromochloromethane (74-97-5)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
§ Bromodichloromethane (75-27-4)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Bromoform (75-25-2)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Bromomethane (74-83-9)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ Butachlor (23184-66-9)	GA	3.5		H(WS)	F
§ Butoxyethoxyethanol (112-34-5)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Butoxypropanol (5131-66-8)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Butylate (2008-41-5)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
§ n-Butylbenzene (104-51-8)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ sec-Butylbenzene (135-98-8)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ tert-Butylbenzene (98-06-6)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ Butyl benzyl phthalate (85-68-7)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

MICROGRAMS/LITER

SUBSTANCE (CAS NO.)	WATER CLASSES	STANDARD	GUIDANCE VALUE	TYPE	BASIS CODE
§ Butyl Isopropyl phthalate (Not Applicable)	A, A-S, AA, AA-S GA		50 50	H(W) H(W)	Z Z
Cadmium (Not Applicable)	A, A-S, AA, AA-S GA	10 10		H(W) H(W)	G F
	A, A-S, AA, AA-S, B, C D	* **		A A	N Q
	SA, SB, SC, I SD	7.7 21		A A	N Q
	SA, SB, SC, I, SD		2.7	H(B)	K

Remarks: * $\exp(0.7852 [\ln (\text{ppm hardness})] - 3.490)$ ** $\exp(1.128 [\ln (\text{ppm hardness})] - 3.828)$

Aquatic standards and guidance values apply to acid-soluble form.

§ Captan (133-06-2)	GA	18		H(W)	F
§ Carbaryl (63-25-2)	GA	29		H(W)	F
§ Carbofuran (1563-66-2)	A, A-S, AA, AA-S GA	15	15	H(W) H(W)	B B
	A, A-S, AA, AA-S, B, C D	1.0 10		A A	N Q
§ Carbon tetrachloride (56-23-5)	A, A-S, AA, AA-S GA		0.4 5	H(W) H(W)	A F
§ Carboxin (5234-68-4)	A, A-S, AA, AA-S GA	50	50	H(W) H(W)	Z J
§ Chloramben (Not Applicable)	A, A-S, AA, AA-S GA	50	50	H(W) H(W)	Z J

Remarks: Includes: related forms that convert to the organic acid upon acidification to a pH of 2 or less; and esters of the organic acid.

§ Chlordane (57-74-9)	A, A-S, AA, AA-S GA	0.1	0.02	H(W) H(W)	A F
	A, A-S, AA, AA-S, B, C, D SA, SB, SC, I, SD		0.002 0.002	H(B) H(B)	K K

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
Chloride (Not Applicable)	A, A-S, AA, AA-S GA	250,000 250,000		H(WS) H(WS)	H F
§ Chlorinated dibenzo-p- dioxins and Chlorinated dibenzofurans (Not Applicable)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C, D	0.000035◇ 0.000001⊕	* *	H(WS) H(WS) H(B)	 K

Remarks: * Guidance value for the total of the chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans that are listed in the table below is 0.0000002 ug/L equivalents of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The 2,3,7,8-TCDD equivalent for a congener is obtained by multiplying the concentration of that congener by its toxicity equivalence factor (TEF) from the table below. The guidance value for Class GA waters does not include the congener 2,3,7,8-TCDD.

The Basis Code for the guidance value for 2,3,7,8-TCDD is A; for all other congeners it is Basis Code A,E.

◇ Applies only to 2,3,7,8-TCDD. The Basis Code for the standard is F.

⊕ Applies only to 2,3,7,8-TCDD.

Human Health Toxicity Equivalence Factors (TEFs)
for Individual Congeners

<u>CONGENER</u>	<u>TEF</u>
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1
Other tetrachlorodibenzo-p-dioxins	0.01
2,3,7,8-Pentachlorodibenzo-p-dioxin	0.5
Other pentachlorodibenzo-p-dioxins	0.005
2,3,7,8-Hexachlorodibenzo-p-dioxins	0.05
Other hexachlorodibenzo-p-dioxins	0.0005
2,3,7,8-Heptachlorodibenzo-p-dioxin	0.005
Other heptachlorodibenzo-p-dioxins	0.00005
Octachlorodibenzo-p-dioxin	0.005
2,3,7,8-Tetrachlorodibenzofuran	0.1
Other tetrachlorodibenzofurans	0.001
2,3,4,7,8-Pentachlorodibenzofuran	0.5
1,2,3,7,8-Pentachlorodibenzofuran	0.05
Other pentachlorodibenzofurans	0.005
2,3,7,8-Hexachlorodibenzofurans	0.1
Other hexachlorodibenzofurans	0.001
2,3,7,8-Heptachlorodibenzofurans	0.005
Other heptachlorodibenzofurans	0.00005
Octachlorodibenzofuran	0.005

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

MICROGRAMS/LITER					
SUBSTANCE (CAS NO.)	WATER CLASSES	STANDARD	GUIDANCE VALUE	TYPE	BASIS CODE
Chlorine, Total Residual (Not Applicable)	A, A-S, AA, AA-S, B, C	5		A	N
	D	19		A	Q
	SA, SB, SC, I	7.5		A	N
	SD	13		A	Q
\$ Chlorobenzene (108-90-7)	A, A-S, AA, AA-S	20		H(WS)	D
	GA	5		H(WS)	J
	A, A-S, AA, AA-S, B, C	5		A	N
	D	50		A	R
	SA, SB, SC, I		5	A	N
	SD		50	A	R
\$ 4-Chlorobenzotrifluoride (98-56-6)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J
\$ Chloroethane (75-00-3)	A, A-S, AA, AA-S		5*	H(WS)	I
	GA	5		H(WS)	J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ Chloroform (67-66-3)	A, A-S, AA, AA-S	7		H(WS)	A
	GA	7		H(WS)	A
\$ 2-Chloronaphthalene (91-58-7)	A, A-S, AA, AA-S	10		H(WS)	D,E
	GA		10	H(WS)	D,E
\$ 2-Chlorotoluene (95-49-8)	A, A-S, AA, AA-S		5*	H(WS)	I
	GA	5		H(WS)	J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ 4-Chlorotoluene (106-43-4)	A, A-S, AA, AA-S		5*	H(WS)	I
	GA	5		H(WS)	J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ 5-Chloro-o-toluidine (95-79-4)	A, A-S, AA, AA-S GA	5	0.7	H(W) H(W)	A J
Chromium (Not Applicable)	A, A-S, AA, AA-S	50		H(W)	G
	GA	50		H(W)	G
	A, A-S, AA, AA-S, B, C	*		A	N
	D	**		A	Q
Remarks: * $\exp(0.819 [\ln (\text{ppm hardness})] + 1.561)$ ** $\exp(0.819 [\ln (\text{ppm hardness})] + 3.688)$ Aquatic standards apply to acid-soluble form.					
Chromium (hexavalent) (Not Applicable)	GA	50		H(W)	F
	A, A-S, AA, AA-S, B, C	11		A	N
	D	16		A	Q
	SA, SB, SC	54		A	N
	I		50	A	N
	SD	1,200		A	Q
Remarks: Aquatic standards and guidance value apply to acid-soluble form.					
§ Chrysene (218-01-9)	A, A-S, AA, AA-S GA		0.002 0.002	H(W) H(W)	A,E A,E
Cobalt (Not Applicable)	A, A-S, AA, AA-S, B, C	5		A	N
	D		110	A	Q
Remarks: Aquatic standard and guidance value apply to acid-soluble form.					
Copper (Not Applicable)	A, A-S, AA, AA-S	200		H(W)	H
	GA	200		H(W)	H
	A, A-S, AA, AA-S, B, C	*		A	N
	D	**		A	Q
	SA, SB, SC, I	2.9		A	N
	SD	2.9		A	Q
Remarks: * $\exp(0.8545 [\ln (\text{ppm hardness})] - 1.465)$ ** $\exp(0.9422 [\ln (\text{ppm hardness})] - 1.464)$ Aquatic standards apply to dissolved form.					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
Cyanide (Not Applicable)	A, A-S, AA, AA-S	100		H(WS)	H
	GA	100		H(WS)	H
	A, A-S, AA, AA-S, B, C	5.2*		A	N
	D	22*		A	Q
	SA, SB, SC	1.0*		A	N
	I		1.0*	A	N
	SD	1.0*		A	Q

Remarks: * As free cyanide - the sum of HCN and CN⁻ expressed as CN.

\$ Dalapon (Not Applicable)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA	50		H(WS)	J

Remarks: Includes: related forms that convert to the organic acid upon acidification to a pH of 2 or less; and esters of the organic acid.

\$ DDT, DDD & DDE (50-29-3; 72-54-8; 2-55-9)	A, A-S, AA, AA-S	0.01		H(WS)	A
	GA	ND		H(WS)	F
	A, A-S, AA, AA-S, B, C, D	0.001		A	S
	SA, SB, SC, SD	0.001		A	S
	I		0.001	A	S

Remarks: Values listed apply to sum of these substances.

\$ Dechlorane Plus (13560-89-9)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J

\$ Demeton (8065-48-3; 298-03-3; 126-75-0)	A, A-S, AA, AA-S, B, C	0.1		A	N
	SA, SB, SC	0.1		A	N
	I		0.1	A	N

Remarks: Values listed apply to sum of these substances.

\$ Diazinon (333-41-5)	GA	0.7		H(WS)	F
	A, A-S, AA, AA-S, B, C	0.08		A	N

\$ Dibromochloromethane (124-48-1)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ 1,2-Dibromo-3-chloro- propane (96-12-8)	A, A-S, AA, AA-S GA	5	0.2*	H(WS) H(WS)	G J
Remarks: * This substance did not receive a review beyond determining the existence of a Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ Dibromodichloro- methane (594-18-3)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
§ Dibromomethane (74-95-3)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ 2,2-Dibromo-3-nitrilo- propionamide & Dibromoacetoneitrile (10222-01-2; 3252-43-5)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C D		50* 50* 20 50	H(WS) H(WS) A A	Z Z N Q
Remarks: Values listed apply to sum of these substances, except as noted below. * Applies to 2,2-dibromo-3-nitrilopropionamide only.					
§ Di-n-butyl phthalate (84-74-2)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
§ Dicamba (1918-00-9)	GA	0.44		H(WS)	F

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ 1,2-Dichlorobenzene & 1,4-Dichlorobenzene (95-50-1; 106-46-7)	A, A-S, AA, AA-S	30*		H(WS)	D
	GA	4.7		H(WS)	F
	A, A-S, AA, AA-S, B, C	**		A	
	D	**		A	
	SA, SB, SC, I		**	A	
	SD		**	A	

Remarks: Value applies to the sum of these substances, except as noted below.

* Applies to 1,4-Dichlorobenzene only.

** Refer to entry for "Dichlorobenzenes."

§ 1,3-Dichlorobenzene (541-73-1)	A, A-S, AA, AA-S	20		H(WS)	D
	GA	5		H(WS)	J
	A, A-S, AA, AA-S, B, C	*		A	
	D	*		A	
	SA, SB, SC, I		*	A	
	SD		*	A	

Remarks: * Refer to entry for "Dichlorobenzenes."

§ Dichlorobenzenes (95-50-1; 106-46-7; 541-73-1; 25321-22-6)	A, A-S, AA, AA-S, B, C	5		A	N,T
	D	50		A	R
	SA, SB, SC, I		5	A	N,T
	SD		50	A	R

Remarks: Values listed apply to sum of these substances.

§ 3,4-Dichlorobenzo- trifluoride (328-84-7)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J

§ Dichlorodifluoromethane (75-71-8)	A, A-S, AA, AA-S		5*	H(WS)	I
	GA	5		H(WS)	J

Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.

§ 1,1-Dichloroethane (75-34-3)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J
§ 1,2-Dichloroethane (107-06-2)	A, A-S, AA, AA-S	0.8		H(WS)	A
	GA	5		H(WS)	J

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ cis-1,2-Dichloroethene (156-59-2)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
§ 1,1-Dichloroethylene (75-35-4)	A, A-S, AA, AA-S GA	5	0.07	H(WS) H(WS)	A J
§ trans-1,2-Dichloroethylene (156-60-5)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
§ Dichlorofluoromethane (75-43-4)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
§ 2,4-Dichlorophenol (120-83-2)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C, D	0.3*** * **		H(WS) H(WS) A	D
Remarks: * Refer to entry for "Phenolic compounds (total phenols)." ** Refer to entry for "Phenols, total chlorinated." *** Also see entry for "Phenolic compounds (total phenols)."					
§ 2,4-Dichloro- phenoxyacetic acid (94-75-7)	A, A-S, AA, AA-S GA	100 4.4		H(WS) H(WS)	G F
§ 1,2-Dichloropropane (78-87-5)	A, A-S, AA, AA-S GA	5	0.5	H(WS) H(WS)	A J
§ Dichloropropanes (78-99-9; 142-28-9; 594-20-7)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J

Remarks: Applies to each isomer (1,1-, 1,3-, and 2,2-) individually.

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ 1,1-Dichloropropene (563-58-6)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ cis-1,3-Dichloropropene (10061-01-5)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ trans-1,3-Dichloropropene (10061-02-6)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ Dichlorotoluenes (32768-54-0; 95-73-8; 19398-61-9; 118-69-4; 95-75-0; 25186-47-4)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
Remarks: Values listed apply to each isomer (2,3-, 2,4-, 2,5-, 2,6-, 3,4- and 3,5-) individually.					
\$ Dieldrin (60-57-1)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C, D SA, SB, SC, SD I	ND * *	0.0009 *	H(WS) H(WS) H(B) H(B) H(B)	A F
Remarks: * Refer to entry for "Aldrin and Dieldrin."					
\$ Di(2-ethylhexyl) adipate (103-23-1)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Diethyl phthalate (84-66-2)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ N,N-Dimethyl aniline (121-69-7)	A, A-S, AA, AA-S GA	5	1.0	H(WS) H(WS)	A,E J
§ Dimethylformamide (68-12-2)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Dimethyl phthalate (131-11-3)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Dimethyl tetrachloro- terephthalate (1861-32-1)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
§ 2,6-Dinitrotoluene (606-20-2)	A, A-S, AA, AA-S GA	5	0.07	H(WS) H(WS)	A J
§ Di-n-octyl phthalate (117-84-0)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Dinoseb (88-85-7)	A, A-S, AA, AA-S GA	* *		H(WS) H(WS)	
Remarks: * Refer to entry for "Phenolic compounds (total phenols)."					
§ Diphenamid (957-51-7)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
§ Diphenylhydrazines (122-66-7; 530-50-7)	A, A-S, AA, AA-S GA	ND	0.05*	H(WS) H(WS)	A F
Remarks: Value listed applies to sum of these substances, except as noted below.					
* Value listed applies to (1,2-) isomer only.					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Diquat dibromide 85-00-7	A, A-S, AA, AA-S GA		20* 20*	H(WS) H(WS)	G G
Remarks: * This substance did not receive a review beyond determining that a final MCL has been promulgated by USEPA. A more in-depth review, currently underway, may lead to a more (but not less) stringent guidance value.					
§ Dodecylguanidine acetate and Dodecylguanidine hydrochloride (2439-10-3; 13590-97-1)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	B B
Remarks: Values listed apply to sum of these substances.					
§ Dyphylline (479-18-5)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	B,E B,E
§ Endosulfan (15-29-7)	A, A-S, AA, AA-S, B, C D SA, SB, SC I SD	0.009 0.22 0.001 0.034	0.001	A A A A A	N Q N N Q
§ Endothall (145-73-3)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
§ Endrin (72-20-8)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C, D SA, SB, SC, SD I	0.2 ND 0.002 0.002	0.002	H(WS) H(WS) H(B) H(B) H(B)	G F K K K
§ Ethylbenzene (100-41-4)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
§ Ethylene chlorohydrin (107-07-3)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Ethylene dibromide (106-93-4)	A, A-S, AA, AA-S GA	5	0.05*	H(WS) H(WS)	G J
Remarks: * This substance did not receive a review beyond determining the existence of a Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ Ethylene glycol (107-21-1)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
	A, A-S, AA, AA-S, B, C		500*	A	N
	D		1,000*	A	Q
Remarks: * Units are mg/L					
\$ Ethylene oxide (75-21-8)	A, A-S, AA, AA-S		0.05	H(WS)	A
	GA		0.05	H(WS)	A
\$ Ethylenethiourea (96-45-7)	GA	ND		H(WS)	F
\$ Ferbam (14484-64-1)	GA	4.2		H(WS)	F
\$ Fluometuron (2164-17-2)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA	50		H(WS)	J
\$ Fluoranthene (206-44-0)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Fluorene (86-73-7)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
Fluoride (Not Applicable)	A, A-S, AA, AA-S	1,500		H(WS)	H
	GA	1,500		H(WS)	F
	A, A-S, AA, AA-S, B, C	*		A	N
	D	**		A	N
Remarks: * $(0.02) \exp(0.907 [\ln (\text{ppm hardness})] + 7.394)$ ** $(0.1) \exp(0.907 [\ln (\text{ppm hardness})] + 7.394)$					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
Foaming agents (Not Applicable)	GA	500		H(WS)	F
Remarks: Determined as methylene blue active substances (MBAS) or by other tests as specified by the Commissioner.					
\$ Folpet (133-07-3)	GA	50		H(WS)	J
\$ Glyphosate (1071-83-6)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
Gross alpha radiation (Not Applicable)	A, A-S, AA, AA-S	*		H(WS)	G
	GA	*		H(WS)	G
Remarks: * 15 picocuries per liter, excluding radon and uranium.					
Gross beta radiation (Not Applicable)	A, AA	*		H(WS)	H
	A-S, AA-S		*	H(WS)	H
	GA	*		H(WS)	H
Remarks: * 1,000 picocuries per liter, excluding strontium-90 and alpha emitters.					
\$ Guafenesin (93-14-1)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Heptachlor & Heptachlor epoxide (76-44-8; 1024-57-3)	A, A-S, AA, AA-S	0.009		H(WS)	A
	GA	ND		H(WS)	F
	A, A-S, AA, AA-S, B, C, D	0.001		A	S
	SA, SB, SC, SD	0.001		A	S
	I		0.001	A	S
Remarks: Values listed apply to the sum of these substances.					
\$ Hexachlorobenzene (118-74-1)	A, A-S, AA, AA-S		0.02	H(WS)	A
	GA	0.35		H(WS)	F
\$ Hexachlorobutadiene (87-68-3)	A, A-S, AA, AA-S	0.5		H(WS)	A
	GA	5		H(WS)	J
	A, A-S, AA, AA-S, B, C	1.0		A	N
	D	10		A	Q
	SA, SB, SC	0.3		A	N
	I		0.3	A	N
	SD	3.0		A	Q

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Hexachlorocyclohexanes (58-89-9; 319-84-6; 319-85-7; 319-86-8; 608-73-1; 6108-10-7)	A, A-S, AA, AA-S		0.02	H(W.S)	A
	GA	ND		H(W.S)	F
	A, A-S, AA, AA-S, B, C	0.01		A	N
	D	2		A	Q
	SA, SB, SC	0.004		A	N
	I		0.004	A	N
	SD	0.16		A	Q

Remarks: Values listed apply to the sum of these substances.

§ Hexachlorocyclo- pentadiene (77-47-4)	A, A-S, AA, AA-S	1.0		H(W.S)	D
	GA	5		H(W.S)	J
	A, A-S, AA, AA-S, B, C	0.45		A	N
	D	4.5		A	Q
	SA, SB, SC	0.07		A	N
	I		0.07	A	N
	SD	0.7		A	Q
§ 2-Hexanone (591-78-6)	A, A-S, AA, AA-S		50	H(W.S)	Z
	GA		50	H(W.S)	Z
§ Hexazinone (51235-04-2)	A, A-S, AA, AA-S		50	H(W.S)	Z
	GA	50		H(W.S)	J
§ Hydrazine (302-01-2)	A, A-S, AA, AA-S, B, C	*		A	N
	D	**		A	Q

Remarks: * 5 ug/L at less than 50 ppm hardness and 10 ug/L at greater than or equal to 50 ppm hardness.

** 50 ug/L at less than 50 ppm hardness and 100 ug/L at greater than or equal to 50 ppm hardness.

Hydrogen sulfide (7783-06-4)	A, A-S, AA, AA-S		**	H(W.S)	
	GA		**	H(W.S)	
	A, A-S, AA, AA-S, B, C	2.0*		A	N
	SA, SB, SC	2.0*		A	N
	I		2.0*	A	N

Remarks: * Undissociated.

** Refer to entry for Sulfides.

§ Hydroquinone (123-31-9)	A, A-S, AA, AA-S	*		H(W.S)	
	GA	*		H(W.S)	
	A, A-S, AA, AA-S, B, C	2.2**		A	N
	D	4.4**		A	Q

Remarks: * Refer to entry for "Phenolic compounds (total phenols)."

** Also see entry for "Phenols, total unchlorinated."

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ 1-Hydroxyethylidene- 1,1-diphosphonic acid (2809-21-4)	A, A-S, AA, AA-S GA		50	H(WS)	Z
			50	H(WS)	Z
\$ 2-(2-Hydroxy-3,5- di-tert-pentylphenyl)- benzotriazole (25973-55-1)	A, A-S, AA, AA-S GA		50	H(WS)	Z
			50	H(WS)	Z
\$ Indeno (1,2,3-cd) pyrene (193-39-5)	A, A-S, AA, AA-S GA		0.002	H(WS)	A,E
			0.002	H(WS)	A,E
Iron (Not Applicable)	A, A-S, AA, AA-S	300		H(WS)	G
	GA	300*		H(WS)	F
	A, A-S, AA, AA-S, B, C	300		A	N
	D	300		A	Q
Remarks: * Also see entry for "Iron and Manganese."					
Iron and Manganese (Not Applicable)	GA	500		H(WS)	F
Remarks: Value listed applies to the sum of these substances.					
\$ Isodecyl diphenyl phosphate (29761-21-5)	A, A-S, AA, AA-S, B, C	1.7		A	N
	D	22		A	Q
\$ Isophorone (78-59-1)	A, A-S, AA, AA-S GA		50	H(WS)	Z
			50	H(WS)	Z
\$ Isopropylbenzene (98-82-8)	A, A-S, AA, AA-S GA	5	5*	H(WS)	I
				H(WS)	J

Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ 4-Isopropyltoluene (99-87-6)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J

Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.

\$ Isothiazolones, total (isothiazolinones) (Includes 5-chloro-2- methyl-4-isothiazolin- 3-one & 2-methyl-4- isothiazolin-3-one) (Not Applicable)	A, A-S, AA, AA-S, B, C D	1 10		A A	N Q
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Remarks: Values listed apply to the sum of these substances.

\$ Kepone (143-50-0)	GA	ND		H(WS)	F
Lead (Not Applicable)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C D SA, SB, SC I SD	50 25 * ** 8.6 220		H(WS) H(WS) A A A A A	G F N Q N N Q

Remarks: * $\exp(1.266 [\ln(\text{ppm hardness})] - 4.661)$

** $\exp(1.266 [\ln(\text{ppm hardness})] - 1.416)$

Aquatic standards and guidance value apply to acid-soluble form.

\$ Linear alkyl benzene sulfonates (LAS) (Not Applicable)	A, A-S, AA, AA-S, B, C	40*		A	N
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Remarks: * LAS with side chains greater than 13 carbons only. Values listed applies to the sum of these substances.

Magnesium (Not Applicable)	A, A-S, AA, AA-S GA	35,000	35,000	H(WS) H(WS)	B B
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TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Malathion (121-75-5)	GA	7.0		H(WS)	F
	A, A-S, AA, AA-S, B, C	0.1		A	N
	SA, SB, SC	0.1		A	N
	I		0.1	A	N
\$ Mancozeb (8018-01-7)	GA	1.8		H(WS)	F
\$ Maneb (12427-38-2)	GA	1.8		H(WS)	F
Manganese (Not Applicable)	A, A-S, AA, AA-S	300		H(WS)	G
	GA	300*		H(WS)	F
Remarks: * Also see entry for "Iron and Manganese."					
\$ Mercaptobenzothiazole (149-30-4)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
Mercury (Not Applicable)	A, A-S, AA, AA-S	2		H(WS)	G
	GA	2		H(WS)	F
	A, A-S, AA, AA-S, B, C, D		0.2	H(B)	K
	SA, SB, SC, I, SD		0.1	H(B)	K
\$ Methacrylic acid (79-41-4)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Methoxychlor (72-43-5)	A, A-S, AA, AA-S	35		H(WS)	H
	GA	35		H(WS)	F
	A, A-S, AA, AA-S, B, C	0.03		A	N
	SA, SB, SC	0.03		A	N
	I		0.03	A	N
\$ Methoxyethylbenzenes (4013-34-7; 3558-60-9)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z

Remarks: Values listed apply to each isomer [(2-Methoxyethyl)benzene and (1-Methoxyethyl)benzene] individually.

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

MICROGRAMS/LITER					
SUBSTANCE (CAS NO.)	WATER CLASSES	STANDARD	GUIDANCE VALUE	TYPE	BASIS CODE
\$ Methylbenz(a)- anthracenes (Not Applicable)	A, A-S, AA, AA-S		0.002	H(WS)	A,E
	GA		0.002	H(WS)	A,E
Remarks: Values listed apply to the sum of these substances.					
\$ Methyl chloride (74-87-3)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J
\$ 2-Methyl-4-chloro- phenoxyacetic acid (94-74-6)	GA	0.44		H(WS)	F
\$ Methylene bithiocyanate (6317-18-6)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
	A, A-S, AA, AA-S, B, C	1.0		A	N
\$ Methylene chloride (75-09-2)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J
\$ 4-(1-Methylethoxy)-1- butanol (31600-69-8)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ 2-Methylethyl-1,3- dioxolane (126-39-6)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Methyl ethyl ketone (78-93-3)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Methyl methacrylate (80-62-6)	GA	50		H(WS)	J
\$ 2-Methylstyrene (611-15-4)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J
\$ 3-Methylstyrene (100-80-1)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Metribuzin (21087-64-9)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
\$ Mirex (2385-85-5)	A, A-S, AA, AA-S		0.04	H(WS)	A
	GA	5		H(WS)	J
	A, A-S, AA, AA-S, B, C	0.001		A	N
	D	0.001		A	Q
	SA, SB, SC	0.001		A	N
	I		0.001	A	N
	SD		0.001	A	Q
\$ Nabam (142-59-6)	GA	1.8		H(WS)	F
\$ Naphthalene (91-20-3)	A, A-S, AA, AA-S	10		H(WS)	D
	GA		10	H(WS)	D
\$ Niacinamide (98-92-0)	A, A-S, AA, AA-S	500		H(WS)	B
	GA		500	H(WS)	B
Nickel (Not Applicable)	A, A-S, AA, AA-S, B, C	*		A	N
	D	**		A	Q
	SA, SB, SC	7.1		A	N
	I		7.1	A	N
	SD	140		A	Q
Remarks: * $\exp(0.76 [\ln(\text{ppm hardness})] + 1.06)$					
** $\exp(0.76 [\ln(\text{ppm hardness})] + 4.02)$					
Aquatic standards and guidance value apply to acid-soluble form.					
\$ Nitratin (4726-14-1)	GA	35		H(WS)	F
Nitrate and Nitrite, total (expressed as N) (Not Applicable)	A, A-S, AA, AA-S	10,000*		H(WS)	G
	GA	10,000		H(WS)	H
Remarks: Value listed applies to the sum of these substances, except as noted below.					
* Applies only to nitrate.					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Nitrilotriacetic acid (Not Applicable)	A, A-S, AA, AA-S	3**		H(WS)	A
	GA	3**		H(WS)	A
	A, A-S, AA, AA-S, B, C	5,000*		A	N
Remarks: * Applies to Nitrilotriacetate. ** Includes related forms that convert to nitrilotriacetic acid upon acidification to a pH of 2.3 or less.					
Nitrite (Not Applicable)	GA	*		H(WS)	
	A, A-S, AA, AA-S, B, C	**		A	
Remarks: * Refer to entry for "Nitrate and Nitrite." ** Value is 100 ug/L for warm water fishery waters and 20 ug/L for cold water fishery waters.					
§ Nitrobenzene (98-95-3)	A, A-S, AA, AA-S	30		H(WS)	D
	GA	5		H(WS)	J
§ N-Nitrosodiphenylamine (86-30-6)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
§ Oxamyl (23135-22-0)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA	50		H(WS)	J
§ Paraquat (4685-14-7)	GA	3.0		H(WS)	F
§ Parathion & Methyl parathion (56-38-2; 298-00-0)	GA	1.5		H(WS)	F
	A, A-S, AA, AA-S, B, C	0.008		A	N,T
Remarks: Values listed apply to the sum of these substances.					
§ Pentachloronitro- benzene (82-68-8)	GA	ND		H(WS)	F
§ Pentachlorophenol (87-86-5)	A, A-S, AA, AA-S	*		H(WS)	
	GA	*		H(WS)	
	A, A-S, AA, AA-S, B, C	0.4***		A	N
	D	**		A	

Remarks: * Refer to entry for "Phenolic compounds (total phenols)."
 ** Refer to entry for "Phenols, total chlorinated."
 *** Also see entry for "Phenols, total chlorinated."

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Phenanthrene (85-01-8)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ Phenol (108-95-2)	A, A-S, AA, AA-S	*		H(WS)	
	GA	*		H(WS)	
	A, A-S, AA, AA-S, B, C, D	**		A	
Remarks: * Refer to entry for "Phenolic compounds (total phenols)." ** Refer to entry for "Phenols, total unchlorinated."					
\$ Phenolic compounds (total phenols) (Not Applicable)	A, A-S, AA, AA-S	1		H(WS)	H
	GA	1		H(WS)	F
Remarks: Value listed applies to the sum of these substances.					
\$ Phenols, total chlorinated (Not Applicable)	A, A-S, AA, AA-S	*		H(WS)	
	GA	*		H(WS)	
	A, A-S, AA, AA-S, B, C, D	1.0		A	R
Remarks: Value listed applies to the sum of these substances. * Refer to entry for "Phenolic compounds (total phenols)."					
\$ Phenols, total unchlorinated (Not Applicable)	A, A-S, AA, AA-S, B, C, D	5.0		A	R
Remark: Value listed applies to sum of these substances.					
\$ Phenyl ether (101-84-8)	A, A-S, AA, AA-S	10		H(WS)	D
	GA		10	H(WS)	D
\$ Phenylpropanolamine (14838-15-4)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
\$ 3-Phenyl-1-propene (637-50-3)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J
\$ cis-1-Phenyl-1-propene (766-90-5)	A, A-S, AA, AA-S		5	H(WS)	I
	GA	5		H(WS)	J

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ trans-1-Phenyl-1-propene (873-66-5)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ Phorate & Disulfoton (298-02-2; 298-04-4)	GA	ND		H(WS)	F
Remark: Value listed apply to sum of these substances.					
Phosphorus (Not Applicable)	A, A-S, AA, AA-S, B		20*	**	**
Remarks: * Applies only where the letter "P" (ponds, lakes and reservoirs) appears in the Water Index Number, excluding Lake Champlain. The department is considering site-specific values for Lake Champlain and for Lake Ontario and Lake Erie, both of which do not have the letter "P" designation.					
** Based on aesthetic effects for primary and secondary contact recreation.					
\$ Picloram (Not Applicable)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
Remarks: Includes: related forms that convert to the organic acid upon acidification to a pH of 2 or less; and esters of the organic acid.					
\$ Polychlorinated biphenyls (Not Applicable)	A, A-S, AA, AA-S GA A, A-S, AA, AA-S, B, C, D SA, SB, SC, SD I A, AS, AA, AA-S, B, C, D SA, SB, SC, I, SD	0.01 0.1 0.001 0.001	0.001 0.0000006 0.0000006	H(WS) H(WS) A A A H(B) H(B)	A F S S S K K
Remark: Values listed apply to sum of these substances.					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Principal organic contaminant (Not Applicable)	GA	5		H(WS)	J

Remarks: This standard applies to any and every individual substance that is in one of the principal organic contaminant classes as defined in 6 NYCRR 700.1 (see Table 5 of this TOGS), except any substance that has a standard for class GA waters listed elsewhere in this Table. Refer to the Introduction of this TOGS for guidance on determining the applicability of the POC standard to individual substances.

A less stringent guidance value for an individual substance may be substituted for this standard if so determined by the Commissioner of the New York State Department of Health, pursuant to 10 NYCRR §5-1.51(g).

\$ Prometon (1610-18-0)	A, A-S, AA, AA-S	50	50	H(WS)	Z
	GA			H(WS)	J
\$ Propachlor (918-16-7)	GA	35		H(WS)	F
\$ Propanil (709-98-8)	GA	7.0		H(WS)	F
\$ Propazine (139-40-2)	GA	16		H(WS)	F
\$ Propham (122-42-9)	A, A-S, AA, AA-S	50	50	H(WS)	Z
	GA			H(WS)	J
\$ n-Propylbenzene (103-65-1)	A, A-S, AA, AA-S	5	5	H(WS)	I
	GA			H(WS)	J
\$ Pyrene (129-00-0)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Pyridine (110-86-1)	A, A-S, AA, AA-S		50	H(W.S)	Z
	GA		50	H(W.S)	Z
§ Quaternary ammonium compounds (including dimethyl benzyl ammonium chloride & dimethyl ethyl benzyl ammonium chloride) (Not Applicable)	A, A-S, AA, AA-S, B, C	10		A	N
Remarks: Value listed applies to sum of these substances.					
Radium 226 (Not Applicable)	A, AA	*		H(W.S)	H
	A-S, AA-S		*	H(W.S)	H
	GA	*		H(W.S)	H
Remarks: * 3 picocuries per liter.					
Radium 226 and Radium 228 (Not Applicable)	A, A-S, AA, AA-S	*		H(W.S)	G
	GA	*		H(W.S)	G
Remarks: * 5 picocuries per liter. Values listed apply to sum of these substances.					
Selenium (Not Applicable)	A, A-S, AA, AA-S	10		H(W.S)	G
	GA	10		H(W.S)	G
	A, A-S, AA, AA-S, B, C	1.0*		A	N
Remarks: * Aquatic standard applies to acid-soluble form.					
Silver (Not Applicable)	A, A-S, AA, AA-S	50		H(W.S)	G
	GA	50		H(W.S)	F
	A, A-S, AA, AA-S, B, C	0.1*		A	N
	D	**		A	Q
	SD	2.3		A	Q
Remarks: * Ionic silver. ** exp (1.72 [ln (ppm hardness)] - 6.52) Standards for D and SD Classes apply to acid-soluble form.					

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Simazine (122-34-9)	A, A-S, AA, AA-S GA	50	4*	H(WS) H(WS)	G J
Remarks: * This substance did not receive a review beyond determining that a final MCL has been promulgated by USEPA. A more in-depth review, currently underway, may lead to a more (but not less) stringent guidance value.					
Sodium (Not Applicable)	GA	20,000		H(WS)	H
Strontium 90 (Not Applicable)	A, A-S, AA, AA-S	*		H(WS)	G
Remarks: * 8 pCi/L If two or more radionuclides are present, the sum of their doses shall not exceed annual potential dose of 4 millirems per year.					
§ Styrene (100-42-5)	A, A-S, AA, AA-S GA	50 5		H(WS) H(WS)	D J
Sulfate (Not Applicable)	A, A-S, AA, AA-S GA	250,000 250,000		H(WS) H(WS)	G F
Sulfides, total (Not Applicable)	A, A-S, AA, AA-S GA		50* 50*	H(WS) H(WS)	D D
	A, A-S, AA, AA-S, B, C SA, SB, SC	** **		A A	
	I		**	A	
Remarks: Values listed apply to sum of these substances. * Expressed as hydrogen sulfide. ** Refer to entry for "Hydrogen Sulfide."					
Sulfite (Not Applicable)	A, A-S, AA, AA-S, B, C	200		A	N
§ Tebuthiuron (34014-18-1)	A, A-S, AA, AA-S GA	50	50	H(WS) H(WS)	Z J
§ Terbacil (5902-51-2)	GA	50		H(WS)	J

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Terbufos (13071-79-9)	A, A-S, AA, AA-S		0.09	H(WS)	B
	GA		0.09	H(WS)	B
\$ Tetrachlorobenzenes (634-66-2; 634-90-2; 95-94-3; 12408-10-5)	A, A-S, AA, AA-S	10		H(WS)	D
	GA	5*	10**	H(WS)	
Remarks: Values listed apply to sum of these substances, except as noted below.					
** Basis Code is D.					
* Applies to each isomer (1,2,3,4-, 1,2,3,5-, and 1,2,4,5-) Individually; Basis Code is J.					
\$ 1,1,1,2-Tetrachloroethane (630-20-6)	A, A-S, AA, AA-S		5*	H(WS)	I
	GA	5		H(WS)	J
Remarks: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ 1,1,2,2-Tetrachloroethane (79-34-5)	A, A-S, AA, AA-S		0.2	H(WS)	A
	GA	5		H(WS)	J
\$ Tetrachloroethylene (127-18-4)	A, A-S, AA, AA-S		0.7	H(WS)	A
	GA	5		H(WS)	J
	A, A-S, AA, AA-S, B, C, D		1	H(B)	K
	SA, SB, SC, I, SD		1	H(B)	K
\$ Tetrachloroterephthalic acid (2136-79-0)	GA	50		H(WS)	J
\$ Tetrahydrofuran (109-99-9)	A, A-S, AA, AA-S		50	H(WS)	Z
	GA		50	H(WS)	Z
Thallium (Not Applicable)	A, A-S, AA, AA-S		4	H(WS)	B
	GA		4	H(WS)	B
	A, A-S, AA, AA-S, B, C	8		A	N
	D	20		A	Q

Remarks: Aquatic standards apply to acid-soluble form.

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ Theophylline (58-55-9)	A, A-S, AA, AA-S GA	40	40	H(WS) H(WS)	B B
\$ Thiram (137-26-8)	GA	1.8		H(WS)	F
\$ Toluene (108-88-3)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ o-Toluidine (95-53-4)	A, A-S, AA, AA-S GA	5	0.6	H(WS) H(WS)	A J
\$ Tolytriazole (29385-43-1)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
\$ Dioxaphene (3001-35-2)	A, A-S, AA, AA-S		0.01	H(WS)	A
	GA	ND		H(WS)	F
	A, A-S, AA, AA-S, B, C	0.005		A	N
	D	1.6		A	Q
	SA, SB, SC	0.005		A	N
	I		0.005	A	N
	SD		0.07	A	Q
\$ 1,2,4-Tribromobenzene (615-54-3)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ Tributyltin oxide (56-35-9)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
§ Trichlorobenzenes (87-61-6; 120-82-1; 108-70-3; 12002-48-1)	A, A-S, AA, AA-S	10		H(W.S)	D
	GA	5*	10**	H(W.S)	
	A, A-S, AA, AA-S, B, C	5		A	N,T
	D	50		A	R
	SA, SB, SC	5		A	N,T
	I		5	A	N,T
	SD	50		A	R

Remarks: Values listed apply to the sum of substances, except as noted below.

** Basis Code is D.

* Applies to each isomer (1,2,3-, 1,2,4-, and 1,3,5-) individually; Basis Code is J.

§ 1,1,1-Trichloroethane (71-55-6)	A, A-S, AA, AA-S		5	H(W.S)	I
	GA	5		H(W.S)	J
§ 1,1,2-Trichloroethane (79-00-5)	A, A-S, AA, AA-S	0.6		H(W.S)	A
	GA	5		H(W.S)	J
§ Trichloroethylene (79-01-6)	A, A-S, AA, AA-S		3	H(W.S)	A
	GA	5		H(W.S)	J
	A, A-S, AA, AA-S, B, C, D		11	H(B)	K
	SA, SB, SC, I, SD		11	H(B)	K
§ Trichlorofluoromethane (75-69-4)	A, A-S, AA, AA-S		5	H(W.S)	I
	GA	5		H(W.S)	J
§ 2,4,5-Trichlorophenoxy- acetic acid (93-76-5)	GA	35		H(W.S)	F
§ 2,4,5-Trichloro- phenoxypropionic acid (93-72-1)	A, A-S, AA, AA-S	10		H(W.S)	G
	GA	0.26		H(W.S)	F
§ 1,1,2-Trichloropropane (598-77-6)	A, A-S, AA, AA-S		5	H(W.S)	I
	GA	5		H(W.S)	J

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ 1,2,3-Trichloropropane (96-18-4)	A, A-S, AA, AA-S GA	5	5*	H(WS) H(WS)	I J
Remark: * This substance did not receive a review beyond determining that it is in a principal organic contaminant class and that it does not have a more stringent Specific MCL. A more in-depth review, currently underway, could lead to a more (but not less) stringent guidance value.					
\$ cis-1,2,3-Trichloropropene (13116-57-9)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ trans-1,2,3-Trichloropropene (13116-58-0)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ alpha,2,4-Trichlorotoluene (94-99-5)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ alpha,2,6-Trichlorotoluene (14-83-7)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ alpha,3,4-Trichlorotoluene (102-47-6)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ alpha,alpha,2-Trichlorotoluene (88-66-4)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ alpha,alpha,4-Trichlorotoluene (13940-94-8)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
\$ 2,3,4-Trichlorotoluene (7359-72-0)	A, A-S, AA, AA-S GA	5	0.34	H(WS) H(WS)	B,E J
\$ 2,3,5-Trichlorotoluene (56961-86-5)	A, A-S, AA, AA-S GA	5	0.34	H(WS) H(WS)	B,E J
\$ 2,3,6-Trichlorotoluene (2077-46-5)	A, AS, AA, AA-S GA	5	0.34	H(WS) H(WS)	B J

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

SUBSTANCE (CAS NO.)	WATER CLASSES	MICROGRAMS/LITER		TYPE	BASIS CODE
		STANDARD	GUIDANCE VALUE		
\$ 2,4,5-Trichlorotoluene (6639-30-1)	A, AS, AA, AA-S GA	5	0.34	H(WS) H(WS)	B,E J
\$ 2,4,6-Trichlorotoluene (23749-65-7)	A, A-S, AA, AA-S GA	5	0.34	H(WS) H(WS)	B,E J
\$ Trichlorotrifluoroethanes (354-58-5; 76-13-1; 26523-64-8)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
Remarks: Values listed applies to each isomer (1,1,1-trichloro-2,2,2-trifluoroethane and 1,1,2-trichloro-1,2,2-trifluoroethane) individually.					
\$ Trifluralin (1582-09-8)	GA	35		H(WS)	F
\$ Trimethylbenzenes (526-73-8; 95-63-6; 108-67-8; 25551-13-7)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
Remarks: Values listed applies to each isomer (1,2,3-, 1,2,4-, and 1,3,5-) individually.					
\$ Trimethylpyridines (1462-84-6; 108-75-8)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
Remarks: Values listed applies to each isomer (2,3,6- and 2,4,6-) individually.					
\$ Triphenyl phosphate (115-86-6)	A, A-S, AA, AA-S GA		50 50	H(WS) H(WS)	Z Z
	A, A-S, AA, AA-S, B, C D	4 40		A A	N Q
Tritium (Not Applicable)	A, A-S, AA, AA-S	*		H(WS)	G
Remarks: * 20,000 picocuries per liter; if two or more radionuclides are present, the sum of their annual dose equivalent to the total body or any organ shall not exceed 4 millirems per year.					
Uranyl Ion (Not Applicable)	GA	5,000		H(WS)	H

TABLE 1 (continued)

NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES

Date of Revision: October 1993

MICROGRAMS/LITER

SUBSTANCE (CAS NO.)	WATER CLASSES	STANDARD	GUIDANCE VALUE	TYPE	BASIS CODE
Vanadium	A, A-S, AA, AA-S, B, C	14		A	N
(Not Applicable)	D	190		A	Q

Remarks: Values listed apply to acid-soluble form.

§ Vinyl chloride (75-01-4)	A, A-S, AA, AA-S GA	2	0.3	H(WS) H(WS)	A G
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§ Xylenes (95-47-6; 108-38-3; 106-42-3; 1330-20-7)	A, A-S, AA, AA-S GA	5	5	H(WS) H(WS)	I J
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Remarks: Values listed applies to each isomer (1,2-, 1,3-, and 1,4-) individually.

Zinc	A, A-S, AA, AA-S	300		H(WS)	H
(Not Applicable)	GA	300		H(WS)	H
	A, A-S, AA, AA-S, B, C	*		A	N
	D	**		A	Q
	SA, SB, SC, I	66		A	N
	SD	95		A	Q

Remarks: Aquatic standards apply to dissolved form.

* $\exp(0.85[\ln(\text{ppm hardness})] + 0.50)$ ** $\exp(0.85[\ln(\text{ppm hardness})] + 0.86)$

Note: Effective January 9, 1994, the department promulgated the above aquatic-based standards for zinc. These new standards supersede the aquatic-based values originally presented in the October 1993 issue of TOGS 1.1.1.

§ Zineb (12122-67-7)	GA	1.8		H(WS)	F
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§ Ziram (137-30-4)	GA	4.2		H(WS)	F
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APPENDIX C
Soil and Groundwater Sampling Analytical Results

TABLE 1. LABORATORY ORGANIC ANALYSIS DATA QUALIFIERS ⁽¹⁾

Qualifiers other than those listed below may be required to properly define the results. If used, they are given an alphabetic designation not already specified in this table or in a project/program document, such as a Quality Assurance Project Plan or a contract Statement of Work. Each additional qualifier is fully described in the Analytical Narrative section of the laboratory report.

U Indicates a target compound was analyzed for but not detected. The sample Reporting Limit (RL) is corrected for dilution and, if a soil sample, for percent moisture, if reported on a dry weight basis.

J Indicates an estimated value. This qualifier is used under the following circumstances:

- 1) when estimating a concentration for tentatively identified compounds (TICs) in GC/MS analyses, where a 1:1 response is assumed,
- 2) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the RL but greater than the method detection limit (MDL).

B This qualifier is used when the analyte is found in the associated method blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. For GC/MS analyses, this qualifier is used for a TIC, as well as, for a positively identified target compound.

E This qualifier identifies compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.

D When applied, this qualifier identifies all compound concentrations reported from a secondary dilution analysis.

A This qualifier indicates that a TIC is a suspected aldol-condensation product.

N Indicates presumptive evidence of a compound. This qualifier is only used for GC/MS TICs, where the identification is based on a mass spectral library search. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N qualifier is not used.

P When applied, this qualifier indicates a reported value from a GC analysis when there is greater than 25% difference for detected concentrations between the two GC columns.

(1) These Data Qualifiers are added by the laboratory to provide additional information for the reported results. *They should not be confused with the qualifiers applied to the reported data as a result of a data validation process performed independently of the laboratory reporting procedure.*

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

COMP334SBDL

Lab Name: STL BALTIMORE

Contract: 001103

Lab Code: ST LABS

Case No.:

SAS No.:

SDG No.:

Matrix: (soil/water) SOIL

Lab Sample ID: 0009618DL

Sample wt/vol: 4.0 (g/ml) G

Lab File ID: VC3A8214.D

Level: (low/med) MED

Date Received: 8/24/00

% Moisture: not dec. 23

Date Analyzed: 9/1/00

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: 10000 (uL)

Soil Aliquot Volume: 100 (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
1534-04-4	Methyl t-butyl ether	320		U
71-43-2	Benzene	320		U
108-88-3	Toluene	490		U
103-65-1	n-Propylbenzene	1500		
98-82-8	Isopropylbenzene	470		
100-41-4	Ethylbenzene	2300		
106-42-3	m&p Xylenes	7700		
95-47-6	o-Xylene	1300		
1330-20-7	Xylenes (total)	8800		
108-87-8	1,3,5-Trimethylbenzene	1500		
98-06-6	tert-Butylbenzene	160		U
95-63-6	1,2,4-Trimethylbenzene	11000		
135-98-8	sec-Butylbenzene	160		U
99-87-6	p-Isopropyltoluene	360		
104-51-8	n-Butylbenzene	590		
91-20-3	Naphthalene	1600		

FORM I VOA

030042

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

COMP 334SB

Lab Name: STL-BALTIMORE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009618

Sample wt/vol: 30 (g/ml) G Lab File ID: SD4A0271.D

Level: (low/med) LOW Date Received: 08/24/00

% Moisture: 23 decanted:(Y/N) N Date Extracted: 08/29/00

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/08/00

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

91-20-3	Naphthalene	1100	
83-32-9	Acenaphthene	120	J
86-73-7	Fluorene	160	J
85-01-8	Phenanthrene	1000	
120-12-7	Anthracene	230	J
206-44-0	Fluoranthene	830	
129-00-0	Pyrene	730	
56-55-3	Benzo(a)anthracene	330	J
218-01-9	Chrysene	370	J
205-99-2	Benzo(b)fluoranthene	190	J
207-08-9	Benzo(k)fluoranthene	270	J
50-32-8	Benzo(a)pyrene	260	J
193-39-5	Indeno(1,2,3-cd)pyrene	110	J
53-70-3	Dibenz(a,h)anthracene	430	U
191-24-2	Benzo(g,h,i)perylene	430	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FT334COMP2RE

Lab Name: STL BALTIMORE Contract: 001103

Lab Code: ST LABS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009710RE

Sample wt/vol: 5.1 (g/ml) G Lab File ID: VA1C8658.D

Level: (low/med) LOW Date Received: 8/25/00

% Moisture: not dec. 18 Date Analyzed: 9/5/00

GC Column: RTX-502 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

1634-04-4	Methyl t-butyl ether	8	
71-43-2	Benzene	2	U
108-88-3	Toluene	4	U
103-65-1	n-Propylbenzene	1	U
98-82-8	Isopropylbenzene	1	U
100-41-4	Ethylbenzene	2	U
106-42-3	m&p Xylenes	2	U
95-47-6	o-Xylene	2	U
1330-20-7	Xylenes (total)	2	U
108-67-8	1,3,5-Trimethylbenzene	1	U
98-06-6	tert-Butylbenzene	1	U
95-63-6	1,2,4-Trimethylbenzene	3	
135-98-8	sec-Butylbenzene	1	U
99-87-6	p-Isopropyltoluene	1	U
104-51-8	n-Butylbenzene	1	U
91-20-3	Naphthalene	4	

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FT334COMP2

Lab Name: STL-BALTIMORE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009710

Sample wt/vol: 30.8 (g/ml) G Lab File ID: SB2D1435.D

Level: (low/med) LOW Date Received: 08/25/00

% Moisture: 18 decanted:(Y/N) N Date Extracted: 08/28/00

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/03/00

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

91-20-3	Naphthalene	400	U
83-32-9	Acenaphthene	400	U
86-73-7	Fluorene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
206-44-0	Fluoranthene	400	U
129-00-0	Pyrene	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

COMP336SB

Lab Name: STL BALTIMORE Contract: 001103

Lab Code: ST LABS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009619

Sample wt/vol: 1.1 (g/ml) G Lab File ID: VA1C8584.D

Level: (low/med) LOW Date Received: 8/24/00

% Moisture: not dec. 19 Date Analyzed: 8/29/00

GC Column: RTX-502 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

1634-04-4	Methyl t-butyl ether	11	U
71-43-2	Benzene	11	U
108-88-3	Toluene	17	U
103-65-1	n-Propylbenzene	70	
98-82-8	Isopropylbenzene	30	
100-41-4	Ethylbenzene	23	
106-42-3	m&p Xylenes	37	
95-47-6	o-Xylene	6	J
1330-20-7	Xylenes (total)	50	
108-67-8	1,3,5-Trimethylbenzene	140	
98-06-6	tert-Butylbenzene	6	U
95-63-6	1,2,4-Trimethylbenzene	420	
135-98-8	sec-Butylbenzene	96	
99-87-6	p-Isopropyltoluene	100	
104-51-8	n-Butylbenzene	130	
91-20-3	Naphthalene	370	

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

COMP 336SB

Lab Name: STL-BALTIMORE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009619

Sample wt/vol: 30 (g/ml) G Lab File ID: SD4A0272.D

Level: (low/med) LOW Date Received: 08/24/00

% Moisture: 19 decanted:(Y/N) N Date Extracted: 08/29/00

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/08/00

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

91-20-3	Naphthalene	260	J
83-32-9	Acenaphthene	120	J
86-73-7	Fluorene	270	J
85-01-8	Phenanthrene	590	
120-12-7	Anthracene	79	J
206-44-0	Fluoranthene	180	J
129-00-0	Pyrene	220	J
56-55-3	Benzo(a)anthracene	74	J
218-01-9	Chrysene	90	J
205-99-2	Benzo(b)fluoranthene	49	J
207-08-9	Benzo(k)fluoranthene	65	J
50-32-8	Benzo(a)pyrene	58	J
193-39-5	Indeno(1,2,3-cd)pyrene	410	U
53-70-3	Dibenz(a,h)anthracene	410	U
191-24-2	Benzo(g,h,i)perylene	410	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FT338COMP2

Lab Name: STL BALTIMORE Contract: 001103

Lab Code: ST LABS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009617

Sample wt/vol: 5.0 (g/ml) G Lab File ID: VA1C8582.D

Level: (low/med) LOW Date Received: 8/24/00

% Moisture: not dec. 23 Date Analyzed: 8/29/00

GC Column: RTX-502 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

1634-04-4	Methyl t-butyl ether	3	U
71-43-2	Benzene	3	U
108-88-3	Toluene	4	U
103-65-1	n-Propylbenzene	1	U
98-82-8	Isopropylbenzene	1	U
100-41-4	Ethylbenzene	3	U
106-42-3	m&p Xylenes	3	U
95-47-6	o-Xylene	3	U
1330-20-7	Xylenes (total)	3	U
108-67-8	1,3,5-Trimethylbenzene	1	U
98-06-6	tert-Butylbenzene	1	U
95-63-6	1,2,4-Trimethylbenzene	1	U
135-98-8	sec-Butylbenzene	1	U
99-87-6	p-Isopropyltoluene	1	U
104-51-8	n-Butylbenzene	1	U
91-20-3	Naphthalene	1	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FT336COMP2

Lab Name: STL-BALTIMORE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 0009617

Sample wt/vol: 30 (g/ml) G Lab File ID: SD4A0268.D

Level: (low/med) LOW Date Received: 08/24/00

% Moisture: 23 decanted:(Y/N) N Date Extracted: 08/29/00

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/08/00

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

91-20-3	Naphthalene	430	U
83-32-9	Acenaphthene	430	U
86-73-7	Fluorene	430	U
85-01-8	Phenanthrene	430	U
120-12-7	Anthracene	430	U
206-44-0	Fluoranthene	430	U
129-00-0	Pyrene	430	U
56-55-3	Benzo(a)anthracene	430	U
218-01-9	Chrysene	430	U
205-99-2	Benzo(b)fluoranthene	430	U
207-08-9	Benzo(k)fluoranthene	430	U
50-32-8	Benzo(a)pyrene	430	U
193-39-5	Indeno(1,2,3-cd)pyrene	430	U
53-70-3	Dibenz(a,h)anthracene	430	U
191-24-2	Benzo(g,h,i)perylene	430	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FT334GW4DL

Lab Name: STL BALTIMORE Contract: 001103

Lab Code: ST LABS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 0009708

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: VA1C8743.D

Level: (low/med) LOW Date Received: 8/25/00

% Moisture: not dec. _____ Date Analyzed: 9/10/00

GC Column: RTX-502 ID: 0.53 (mm) Dilution Factor: 200.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/L Q

1634-04-4	Methyl t-butyl ether	360	D
71-43-2	Benzene	5600	D
108-88-3	Toluene	2600	D
103-65-1	n-Propylbenzene	170	JD
98-82-8	Isopropylbenzene	200	U
100-41-4	Ethylbenzene	2200	D
106-42-3	m&p Xylenes	3000	D
95-47-6	o-Xylene	660	D
1330-20-7	Xylenes (total)	4000	D
108-67-8	1,3,5-Trimethylbenzene	200	U
98-06-6	tert-Butylbenzene	200	U
95-63-6	1,2,4-Trimethylbenzene	800	D
135-98-8	sec-Butylbenzene	200	U
99-87-6	p-Isopropyltoluene	200	U
104-51-8	n-Butylbenzene	200	U
91-20-3	Naphthalene	200	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FT334GW4

Lab Name: STL BALTIMORE Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 0009708

Sample wt/vol: 980 (g/ml) ML Lab File ID: SD4A0246.D

Level: (low/med) LOW Date Received: 08/25/00

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/29/00

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/07/00

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/L Q

91-20-3	Naphthalene	110	
83-32-9	Acenaphthene	10	U
86-73-7	Fluorene	10	U
85-01-8	Phenanthrene	1.2	J
120-12-7	Anthracene	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

APPENDIX D
Boring Logs

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB1

PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	SLIME/CLAY RECOVERY +	USCS CLASS	MUNSELL COLOR	PI HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRELLING DATA/REMARKS	G A S I N G
1'		0840 75%			0.0	0-4" Asphalt. 4"-4' sl. moist Brown F-M. sand. No odors. Backfill		
2'								
3'								
4'		0845 85%			503 ppm PI Malfunction?	4'-7' - same as above 7'-7.2' - Moist silt brown. 7.2'-8' - M-Coarse sand w/ gravel. Bottom 3' - TPT odor, grey staining.		
5'								
6'								
7'								
8'								
9'	FT334 SB-1	0854 90% 0900			8-9': 80ppm 9-12': 15ppm	8'-9' - Saturated sand silt - dk. gray - strong TPT odors. 9'-12' - Gray soil mottled clayey-silt, sl. moist. May be above water table; sl. stiff med. plasticity		
10'								
11'								
12'								
13'								
14'								
15'								
16'								

All depth measurements should be in feet or tenths of feet

A Borehole record indicates to this extent 11.111111111111111

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 1PROJECT NAME: Toften

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY %	USCS CLASS	MUNSELL COLOR	PI HEADSPACE READING (ppm)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
10								
11								
12		96%			25ppm	0910 12-16' Gray clayey silt, 10% rusty mottling TPH odor		
13								
14						Checked draw - wet at 9' bgs (hole filled to 9')		
15								
16						EOB		

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 2

PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY +	USCS CLASS	MUNSELL COLOR	PI HEADSPACE READING (ppm)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I H O
1		70%		10YR 5/4	0.0ppm	0-4" Asphalt		
2						4"-4' Sl. Moist Yellowish brown Med. sand - fill. No odors.		
3								
4		70%		10YR 5/4	0.0ppm	4'-7.5' Sl. Moist Med. Sand, Yellowish-brown fill. No odors.		
5						9.5		
6								
7					12ppm	7.5-8' Saturated m. sand. + silt. - Perched water? silt at bottom 3". Stained grey Strong TTH odors.		
8								
9								
10								

All depth measurements should be in feet or tenths of feet

▲ Record sand intervals in this column if any

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 2

PROJECT NAME: Totten

DEPTH (FT.)	SAMPLE NO.	SLOW-SOONER RECOVERY %	UCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRIILING DATA/REMARKS	C A S I N G
8	FT 334 SB 2-1	75% Time 0950			500 ppm	8-12' Saturated silt + clayey silt. Strong TPT odor. Dark Gray.		
9						9-12' Moist clayey silt, <u>not</u> saturated. Gray TPT stained, ~10% rusty mottling.		
10								
11								
12					1015 12-16' 10-18 ppm.	Saturated clayey silt. TPT odor. Stained gray, some rusty mottling.		
13					1020	Water Level at <u>8.5'</u> bgs.	1000. water at 9' bgs checked w/ water level indicator	
14							note: Macro cone stuck in rods.	
15								
15.5						Refusal at 15.5'.		

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB3PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT RECOVERY %	USCS CLASS	MUNSELL COLOR	PH HEADSPACE READING (PPH)	SOIL/ROCK DESCRIPTION	DRELLING DATA/REMARKS	C A S I N G
1		70%		2.5YR 5/4	0.0ppm	0-4" Asphalt 4"-4' SL Moist Med Sand Fill, Brown. No odor		
2								
3								
4		60%				4'-6' same as above		
5								
6					23ppm	6'-7.5' Lt. Brown Native M-Coarse Sand w/ small rounded gravel. TPH odor		
7					80ppm	7.5-8' - wet silt. Dk. gray - Strong TPH odor.		
8								

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 3

PROJECT NAME: Totten

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY +	UNCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DILLING DATA/REMARKS	C A S I N G
28	FT 334	90%			1,000 +	12-13' - Gray & dk gray soil. V. Strong TPH odor, 8-9' trace of product (Dk brown & black)		
29	SB 3-1	60% 90% G.Z.				9-12' clayey silt, very moist.		
14.6	GZ					8-12' strong TPH/gasoline odor, Gray w/ rusty mottling, sl. moist. to moist.		
15.4								
12		60% 60%			15 ppm	Refused at 15.5' by G.Z.		
13						12-15.5' Moist Gray clay + silt, ^{G.Z.} stiff sl. clayey silt, silty-clay, Med-plasticity, sl. to odor		
14					5-9 ppm			
15						Refused		
16.5								

GEOLOGIC BORING LOG*

Project: <u>Fort Totten</u>				Boring: <u>FT 334 SB4</u>					
Geologist: <u>Greg Zynda</u>				Signature: _____					
Drilling Company: <u>Maxim Tech.</u>						Drilling Rig: _____			
Drilling Method: <u>Geoprobe</u>									
Sampling Method: <u>Macro cone</u>									
Bit Type/Size: _____				Borehole Diameter: <u>1.25"</u>					
Date Boring Started <u>8/22/00</u>				Completed: _____					
First Encountered Water Level: _____				Date: _____					
Stabilized Water Level: _____				Date: _____					
Geophysical Logging: _____				Date: _____					
Depth to Bedrock: _____				Ground Elev: _____					
Total Depth of Boring: _____									
No. Drums Cuttings: _____				No. Drums Drilling Fluid: _____					
WELL COMPLETION INFORMATION									
Casing Type/Diameter: _____				Screen Length/Slot Size: _____					
PVC Stick Up: _____				Sand Size: _____					
Total Depth of Well From TOC: _____									
DRILLING SCHEDULE									
Date	Time		Depth of Drilling Per Shift		Date	Time		Depth of Drilling Per Shift	
	Start	End	Start	End		Start	End		
<u>8/22</u>			<u>0</u>	<u>16</u>					
				<u>EOB</u>					
<u>8/24/00</u>	<u>0815</u>	<u>1100</u>	<u>16</u>	<u>24'</u>					
ABBREVIATIONS:					LOCATION SKETCH:				
Abbreviation		Meaning:							
Trace Amount		Less than 5%							
Few		5-10%							
Little		15-25%							
Some		30-40%							

* All depth measurements should be in feet or tenths of feet.

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 4PROJECT NAME: Fort Totter

DEPTH (FT.)	SAMPLE NO.	SLOW COUNT/ RECOVERY %	USCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DILLING DATA/REMARKS	DATE
1		66%		2.5YR 5/4	0.0	0-4" Asphalt 4"-4' Medium Brown Sand. Slightly Moist Fill		
2								
3								
4		60%		2.5YR 5/4		4-7' - Same as above.		
5						7'-8' - Moist blacktop pieces, red brick on top material.		
6								
7								
8								

All depth measurements should be in feet or tenths of feet

Record exact intervals in this column if drilling is done

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 4PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	SLOW-COUNTER RECOVERY +	USCS CLASS	MUNSELL COLOR	PI HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
8		70%			50	8-9' Saturated M-C. sand. TPT - odor, stained Dk. grey. - perched water.		
9	FT 334	1140			500 ppm	Moist, silt, Dk grey + grey. Strong TPT odor.		
10	SB-4				22- 32 ppm	Sl. Moist clayey-silt, grey + stringly mottled, TPT odor w/ desiccation cracks.		
11					↓			
12		60%			20- 3-20 ppm	12-16' Sl. Moist clayey-silt, very mottled w/ desiccation cracks. TPT odor.		
13						Note - <u>above</u> water table		
14					↓			
15					↓			
16					↓	EOB		

GEOLOGIC BORING LOG (Continued)

BORING NO.:		PROJECT NAME:	
FT 334 SB 4		Fort Totten	

DEPTH (FT.)	SAMPLE NO.	LOW-COUNTER RECOVERY %	USCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRELLING DATA/REMARKS
16				5Y	PID		
17				5/3	Malfunction		
18							
19							
20							
21							
22							
23							
24							

8/24/00

Using drive pt. in previous boring. drive to 16'

• Rods pushed down slowly - v. tight formation. 0900

• Very poor core sample - Soil stuck in Rod.

~19-19.5' - Sl. Moist, silt, clayey-silt, slight TPH odor. DK Gray

~19.5-20 - DK gray + gray A-F sand, tr. gravel. "Old" TPH odor, Moist

~20' at tip of rod - greyish-brown A-F sand. TPH odor, Moist

blackish

16' - Clean silty-clay - No odors, Sl. Moist to Moist, at tip of rod plasticity. trace mottling. Olive color. rod

20-22' Saturated f-M sand, tr. gravel. Old decomposed gas line odors. greyish brown, loose, 20% mottled.

22-24' Saturated f-M sand, 5% gravel, Old gas decomposed odor, black stained at 22.5'.

All depth measurements should be in feet or tenths of feet.

◆ Record cored intervals in this column if drilling bedrock.

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB 5

PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	BLOW/COUNT/ RECOVERY %	UNCS CLASS	MUNSELL COLOR	PID HEADFACE READING (PPT)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
1		40 76%		7.5YR 5/4	0.0	0-4" Asphalt 4"-4' Sl. moist Medium sand, No odor Fill Material, Brown		
2								
3								
4		60%				4-7.5' same as above.		
5						7.5-7.8' - Saturated medium sand Brown No odor		
6								
7								
8						7.8-80' - Saturated Dk. gray fill TP4 odor PID not functioning		

All depth measurements should be in feet or tenths of feet

Record exact intervals in this column if different

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT334 SB5

PROJECT NAME: Font Tolben

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY +	USCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
8	FT334 SB5	1240 80%			PID not working properly	8-9' - St. Moist, stiff silt. gray w/ mottling & desiccation cracks. Dk gray + black sz.		
9						9-12' - gray silt. + clayey silt, St. Moist, desiccation cracks.		
10								
11								
12		70%				TPH odor 12-16' Moist, but not saturated gray silt, w/ desiccation crack.		
13								
14								
15						light TPH odor		
16						EOB		

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 334 SB5		8/24/00		PROJECT NAME: Fort Totten				
DEPTH (FT.)	SAMPLE NO.	PERCENTAGE RECOVERY	USCS CLASS	MURRELL COLOR	PID HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRELLING DATA/REMARKS	CASINO
16		100%			5-10 ppm	16-18.5' Mottled - 5-10% clay-silt, + silt, crumbly, v. sl. to sl. moist. Sweet-sour odor. Olive color, slightly plastic.	Using drive pt. to 16'.	
17								
18								
19					6-10 ppm	18.5-20' - crumbly dk. gray stained silt + clayey silt, Sweet-Sour odor.		
20								
21	FT 336	100%			10 ppm	20-20.5' - sl. moist dk. gray stained silt + clayey silt, Sweet-Sour odor.		
22	98				40-75 ppm	20.5-24' Subrounded M-F sands fr. silt (5%), old granular odor. (20.5-22' - dk gray, bluish gray olive gray colors)		
23	COMP 2 (combined w/ sample from FT 334 SB4)					22-24' - reddish-brown + olive brown color)		
24								

1.1 depth measurements should be in feet or tenths of feet.

◆ Record cored intervals in this column if drilling bedrock.

GEOLOGIC BORING LOG (Continued)

BORING NO.: F+ 336 501					PROJECT NAME: Fort Totten				
DEPTH (FT.)	SAMPLE NO.	SLOW-COUNTER RECOVERY +	USCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPH)	SOIL/ROCK DESCRIPTION		DRELLING DATA/REMARKS	D A S I N G
1		60%		7.5YR 5/4	0.0	0-4' Brown, slightly moist medium sands. No odors			
2									
3									
4						4'-6' - Same as above. No odors			
5		75%			0.5	6- ^{6.2} 6.5 ' Saturated Med Sands, Brown, slight red odor			
6					5-8	7- ^{6.2} 7.5 ' Saturated Med-Coarse Sands, TPT odor, stained yellowish-grey.			
7									
7.5						Refusal from concrete pad at 7.5' bgs.			
8									

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB 2						PROJECT NAME: Fort Totten		
DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY %	USCS CLASS	MUNSELL COLOR	PIG HEADSPACE READING (ppm)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
1		60%		7.5YR 5/4	0.0	0'-4' St. Moist Brown sand (fill) No. logs		
2								
3								
4		75%				4'-6' Same as above		
5								
6					5-101 ppm.	6-7.5 - dk. gray F-C sands TP64 odors, Saturated.		
7						7.5 - refect- concrete pad.		
8								

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB3

PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY %	USCS CLASS	MUNSELL COLOR	PIG HEADSPACE READING (PPT)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	DATE
1						0-4' Brown M-Sands, No odors. Sl. Moist		
2								
3								
4						4-7.5 - Same as FT 336 SB1 + SB2.		
5						6' - Submerged.		
6								
7					132 ppm	7.5' - Trace of oil product. Totten		
8						7.5' Refusal		

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB 4

PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT/ RECOVERY %	USCS CLASS	MUNDELL COLOR	PID HEADSPACE READING (ppm)	SOIL/ROCK DESCRIPTION	DRELLING DATA/REMARKS	C A S I H G
1						No s.d. loc.		
2						0-4' same as. FT 336 SB 1 Hoag SB4.		
3								
4					0.0	4-6' - Same as FT 336 SB 1 - SB4.		
5					0.0	6-6.5 - Saturated Brown		
6					50-115 ppm.	6.5-7.5 - Dk grey stained soil.		
7						Refusal at 7.5' - Concrete Pad from UST?		
8								

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB 5

PROJECT NAME: Font, Tothen

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT RECOVERY +	USCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPH)	SOIL/ROCK DESCRIPTION	DILLING DATA/REMARKS	C A S I H B
1		60%			0.0	0-1 Top soil		
2						1-4' F-M. sandy Brown, sl. Moist, - Native Soil. No odor		
3								
4		25%		10YR 5/1	0.0	4-6' Moist. 4'-8' Fine-Coarse well rounded sands Native soil.		
5						saturated at 6' bgr. No odors. Yellowish - Brown		
6								
7								
8								

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB5

PROJECT NAME: Font Totten

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT RECOVERY %	USCS CLASS	MUNSELL COLOR	PI HEADSPACE READING (ppm)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
8	FT336 -SB5-	80%		10YR 3/2	0.0	8-9' Catenaed, Fine sandy silt. No odors Dark Grey.	1535	
9		1535			0.0	9-10' Moist Silty F. Sand, & hard. Grey & Light Brown		
10					0.0	10-12' St. Moist, Silt - Native soil. Grey, & Light Brown		
11						EOB		
12		~25% poor recovery for ~3' fluff; submerged f. sand & silt		5Y4/1	0.0	15-16' still above water table. St. Moist silt, light color Dk. grey No odors.	8/23/00 @ 730 hole filled to 3' since yesterday	
13								
14								
15								
16	FT336 Comp 2 +			5Y4/1	0.0	16-20' Poor core sample - Had to hammer out sample from core. - Silt at bottom of core. (Mixture of Dk-grey f. sand, silt) + coarse sand -> fluff from 6-8' bgs.		
17								
18								
19								
20								

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 S85						PROJECT NAME: Totten		
DEPTH (FT.)	SAMPLE NO.	SLOW COUNTS/ RECOVERY *	USCS CLASS	MUNSELL COLOR	PH HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	D A T E
20 21 22 23 24		100%		54 54 5/2	6.0	20-24' No odors. Silt, Sl. Moist. Greenish gray Olive, layered.		
25 26 27 28		100%		54 5/2	6.0	24-28' No odors - Silt, Sl. Moist, crumbly, layered. Saturated med. sand at bottom of core, May be in a water zone.		
29 30 31 32		100%		54 5/2	0.0	28-32' No odors. Silt, Sl. Moist, layered. Groundwater not encountered. only 1 ft EOB.		

*/ depth measurements should be in feet or tenths of feet.

◆ Record cored intervals in this column if drilling bedrock.

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB6 (next to trans. Grimes.)

PROJECT NAME: Totten

DEPTH (FT)	SAMPLE NO.	BLOW COUNT RECOVERY +	USCS CLASS	MUNSELL COLOR	PIG HEADSPACE READING (PPM)	SOIL/ROCK DESCRIPTION	DRELLING DATA/REMARKS	C A S I H O
1		50%	5YR 5/4		0.0	0-4' Fill Material M-Coarse Sand w/ 5% gravel. No odors. Reddish-Brown.		
2								
3								
4		60%			0.0	4-6' Same as above.		
5					0.0	6-7' Saturated - No Odors M-C Sand w/ 20% gravel, - greyish-brown		
6					60-159	7-8' Saturated - Strong TPH odor 20% gravel, M-C Sands, Dk. Gray		
7	FT 336				40-70	8-9' Same as above.		
8	SB6-1	70%			15 ppm	9-11' Silty f. sands - Dk gray + Black. Saturated. Strong TPH odor.		
9					0-3	11-12' Moist Fine Sands, slight TPH odor.		
10					0-8 ppm	12-14.5' Sl. Moist to Moist F. Sands + Silty F. Sands. Slight TPH odor.		
11		~50%						
12								
13								
14								
15	FT 336					14.5-16'		
16	SB6-2		5YR 5/4		0.0	Gray Silt, No odor, sl. moist-		
						EOB		

GEOLOGIC BORING LOG*

[illegible]

° All depth measurements should be in feet or tenths of feet.

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB 7

PROJECT NAME: Fort To Hec

DEPTH (FT.)	SAMPLE NO.	WEIGHT/COUNT/RECOVERY	USCS CLASS	MUNSELL COLOR	PID HEADSPACE READING (PPT)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
1		50%			0.0	0-4' Reddish - Brown M-C sand, 60% gravel, Fill No odor.		
2								
3								
4								
5		70%			PID Multifactor, 1	4-6' Same as above. 6-8.5' Saturated. m-c sands.		
6								
7	FT 336					7-8' Grey silt and F-M C sands, TPH odor, @ Very Moist		
8	COMP	80%				6.5-8' Saturated, Grey stained silty fine sand. stray TPH odor, oil sheen		
9	RT1					8-10.5' Reddish Brown + Greyish Brown M sand + fine sand, Saturated. No odors		
10						10.5-12' Light olive-brown V. moist M-c sand, 20% gravel, No odor		
11								
12	FT 336			2.59 5/3		12-13' Moist to Sl. Moist F. Sands and silt No odors, Olive Green.		
13	COMP			5.9 5/2				
14	2							
15								
16						EOB		

GEOLOGIC BORING LOG (Continued)

BORING NO.: FT 336 SB 8

PROJECT NAME: Fort Totten

DEPTH (FT.)	SAMPLE NO.	BLOW-COUNTER RECOVERY +	USCS CLASS	MURRELL COLOR	PI HEADSPACE READING (ppm)	SOIL/ROCK DESCRIPTION	DRILLING DATA/REMARKS	C A S I N G
1		50%			PID	0-4' F. (1) Sl. moist, M. sands, Reddish-Brown.		
2					Moisture			
3								
4						4-5.5' Same as above, Saturated at 5' bgs. No odor.		
5		80%				5.5-6' Saturated, Grey stained silty f. sand, FPH odor.		
6						6-9' Saturated, mottled grey f. sand + silt, slight FPH odor.		
7	FT 336							
8	BA COMP 1	75%				9-10.5' Saturated Silty f. sands, No odors.		
9						10.5-12' Olive Brown, v. moist silty fine sand w/ <5% well rounded gravel.		
10								
11								
12						12-16' Sl. Moist silt w/ trace clay & well rounded gravel. +		
13	FT 336	90%				14-14.5' - Interval of sl. moist f-m sands, silty		
14	COMP 2					-14.3 6.2		
15						EOB		
16								

APPENDIX E
Purge Form

GEOPROBE GROUNDWATER SAMPLING FORM

Date: 8/24/00

Project: Fort Totten

Well ID: FT 334 ~~SB4~~ GW4

Site Description: Bld. 334 - boring FT334 SB4

PID Reading Upon Well Opening: PID Malfunctioning - 1130 - PID of range under 20 ppm old gasoline odor.

(a) Depth to Water ~20' bgs. ft (TOC) (d) Well Diameter 1/2" in
(b) Total Depth 24' ft (TOC) (e) Boring Diameter 1.25 in
(c) Water Column Height (b-a) ft (f) Screen Length 20-23 ft
(g) PVC Stick-Up ft

Well Volume Calculation = (Volume of Water in Casing) + (Volume of Water in Screened Well Annulus)
(in gallons)
= $(\pi)(d/2)^2(c)(0.0516) + (\pi)[(e/2)^2 - (d/2)^2](f)(0.3)(0.0516)$

Geoprobe sample - screen - 20'-23' bgs

1 Well Volume gal.

5 Well Volumes gal.

Type of Well Purge Equipment: Bailer Volume:
Pump Type Peristaltic Rate:

Time Purging Began: 1017

Time	Volume (gal)	Temperature (°C)	pH	Conductivity (µMho/cm)	Redox (mV)	DO (mg/L)	Turbidity (NTU)	Sp. Cond.
1022	0.5	26.3	6.88	1.34		<0.25	999	0.05
1026	1.0	18.5	7.09	1.14		<0.25	999	0.05
1038	2.0	19.5	7.10	1.15		<0.25	999	0.05

Well Went Dry?: Yes ☒ No ☐ Volume Removed: gal. Recovery Time: min

Total Volume Removed: 2.0 gal.

Sample Time: 1030

Analyses: VOCs + MTBE, SVOCs

Comments: Strong old gasoline odor, tr. oil sheen at start of purge

Sampler: G. Zynda

APPENDIX F
Photo Log



Building 334 Former UST area, facing north.



Building 336 Former UST area, facing east.